

## SIERRA CLUB BULLETIN.

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VOL. IV.

SAN FRANCISCO, JUNE, 1902.

No. 2.

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### INTO THE HEART OF CATARACT CAÑON, GRAND CAÑON OF ARIZONA.

BY REV. WILLIAM A. BREWER.

Now that the Grand Cañon of Arizona has been "discovered," and the Santa Fe trains run to its very edge, or rim, we are likely during the next few years to hear much of its depths and heights, of its fauna and flora, and of the marvelous color-effects reflected from the ribboned strata of its rocky cliffs. I should like, however, in this article to take my readers to the Grand Cañon and beyond, and to tell them of a trip that I made in the summer of 1901 into the heart of a cañon tributary to the Grand Cañon—a cañon lacking in the stupendous heights and distances of the greater gorge, but abounding in brilliant-colored cliffs, in wonderful vegetation, in waterfalls surpassed in beauty by none in all the world—a cañon in whose rocky heart dwells a hermit-tribe of Indians, whose history and customs make up one of the most romantic chapters in the story of the native tribes of America.

Cataract Cañon, or Havasupai Cañon, begins as an insignificant rocky gorge, not far from Williams, Arizona. For one hundred miles (at a rough guess) it zigzags its

way to the northwest, gradually increasing in depth and grandeur, until finally it finds its way into the Grand Cañon, and its blue waters mingle with the muddy tide of the Colorado. If Cataract Cañon is one hundred miles long, ninety-two of those miles will show you a barren gorge, narrow, desolate, with scarcely a tree or shrub or living thing, its thirsty bed of sand and gravel knowing not what moisture means, save when the summer cloud-burst brings a momentary deluge that cuts and carves its way through the living rock.

But at the beginning of the ninety-third mile, or about eight miles above its junction with the Grand Cañon, a marvelous change occurs. In the cañon's bed, before your astonished eyes, there well up great bubbling springs of water—springs fifteen feet in diameter—and discharging torrents of the bluest water that you ever saw in all your life. And as you glance down the cañon you behold the Havasu River, and the breeze brings to your ears the distant echo of its torrents and waterfalls. Here in this gorge, scarcely a quarter of a mile wide, boxed in by walls of superb red sandstone, towering upwards for four hundred feet on either side, dwell our hermit Indians. *Havas* means "blue water" in their language, and *pai* means "people." They are the Havasupai Indians, known to cowboys and to the outer world as Supais. One can easily believe that many generations ago these red men dwelt upon the plains above, and tiring of the ceaseless warfare with Apaches and other hostile tribes, withdrew from the main company and sought the peaceful recesses of this rocky retreat. Their traditions tell how a band of Apaches trailed them later on, and laid siege to them. But the Havasupais loved their new home too well to give it up, and not an Apache returned to tell the tale. All were ambuscaded and killed.

But I have not told my readers how to reach the so-

called Supai villages; and as my purpose in writing these hasty lines is to enable others to enjoy the sights which I have seen, I shall describe somewhat minutely the trip thither. In the *SIERRA CLUB BULLETIN* of June, 1901, I have told how I reached Bass Camp, or Surprise Outlook, on the rim of the Grand Cañon. Briefly, the Santa Fe train took me from San Francisco to Williams, Arizona, whence the Grand Cañon Railway makes its sixty-mile trip to the Bright Angel Hotel at the rim. At a station about ten miles from the terminus Mr. W. W. Bass (whose post-office address is Williams, Arizona) met me with a team and took me to Bass Camp, a point on the rim some twenty-six miles west of Bright Angel Hotel. I found Bass Camp an excellent base from which to make the Cataract Cañon trip, for here were experienced and accommodating guides, good horses and burros, and abundant supplies.

My journal tells me that at four o'clock on the afternoon of May 25, 1901, we left Bass Camp for Cataract Cañon. There were five of us—two men and three horses. My guide was Richard Bleak, known on the Painted Desert as "Dad." The third horse carried the pack, consisting of provisions and cooking utensils, deposited in regulation cuyacks, a bag of barley above and between, and, towering over all, our blankets. The diamond hitch held all these goods together, and our pack-horse fell into a gentle lope from time to time, without the slightest danger to blankets or bacon, as we trailed across the desert. There were twelve miles of desert before us. Our trail led through forests of piñon, cedar, and juniper. There were flowers of brilliant hue at our feet, a hawk or buzzard could be seen overhead now and then, and the sun, descending behind some black clouds in the west, cast its brilliant rays in our eyes as we pushed on. We failed to reach Topocobya before nightfall, however, and



MAP OF THE GRAND CAÑON OF THE COLORADO AND VICINITY, ARIZONA.

made our camp beside the road. About two miles back we had gone through a newly built gate in a north-and-south fence, which Dad told me marked the eastern boundary of the Supais' horse-pasture, and within the inclosure we saw a little later four of their ponies grazing.

Early the next morning we were again on the trail. The country, as we proceeded westward, became more hilly, with deep washes, along one of which our trail led. Soon the sides became more precipitous, and the path rocky. But I was quite unprepared for the sight that was soon to meet my eyes. Our trail suddenly left the wash, and we found ourselves at the top of a vast declivity bestrewn with huge sandstone boulders, any one of which seemed likely at an instant's notice to topple over and find its thunderous way to the gorge's bed beneath. In and out among these boulders, always downward, we threaded our dangerous way. It was the steepest, roughest, most dangerous trail that I had ever known. Straight



down, it was perhaps one thousand feet, but the many turns and bends made the trail much longer. Just before we reached the bottom we made a sharp turn to the left, and found ourselves at Topocobya. It is a huge precipice, fully four hundred feet in height, semi-circular, and giving forth at its base some trickling streams of water that form three shallow pools, one ten feet in diameter, one six, and one four. In front of the pools is a black willow thirty feet high and a foot in diameter. The pools are full of wigglers. But wigglers show that the water is not stagnant, or, as my guide put it, "If the wigglers can stand it, I can." It is the first water that the horses have had since they left Bass Camp. They drink their fill, and we replenish our canteens. The sun was at such an angle that I could not get a photograph of Topocobya cliff, nor have I ever seen a picture of it. Let us hope that this summer some member of the Sierra Club may be more successful.

We have now reached the half-way point of our journey. Down Topocobya Cañon (sometimes called Lee Cañon) for some five or six miles our trail leads us along the bottom or sides of a rocky gorge. We start in a stratum of yellow sandstone, but soon reach the red, and note the remarkable "seal-head" formations in the rocky wall on either side. In some places the trail leads along smooth, shelving rock, and if the horses' shoes are worn there is great danger of slipping. This is especially the case in one or two places near the mouth of Topocobya Cañon. In order to get into Cataract Cañon at this point we have to make a sharp turn to the left into a tributary gorge known as Rattlesnake Cañon, and along the shelving rock at the turn the traveler is willing indeed to obey his guide's instructions to dismount and take the path on foot. I must mention here the superb masses of light sandstone

that met our gaze in the western distance as we journeyed along Topocobya Cañon. One huge pile assumes the shape of a glorious cathedral, with noble pillars and buttresses—a pile from whose colossal bulk could be hewn stone enough to construct all the cathedrals that the world has ever seen.

At last we have reached Cataract Cañon, and there remain but three or four miles of trail along its sandy bottom before we reach the Supai villages. The turns in the cañon during this distance are as sharp and acute as the angles of a streak of lightning, and many times more numerous. One traveler tied forty-three knots in the fringe of his buckskin shirt when making the journey—one knot for each turn. But we are hot and tired, and before we enter upon the home-stretch to the right we visit the interesting pictographs to be seen in a sort of cave about one hundred feet away on the left. (Illustration 2.) No living Indian seems able to interpret these symbols. They are frescoed upon the rock in beautiful colors, and would seem to be prehistoric. Cushing describes this place as "a resounding cave, the walls of which were painted with emblems, and whose nooks were the hunting shrines of the strange inhabitants. . . . Here, seated on the ground, the worshiper blows smoke to the north, west, south, and east, upward and downward; then says in a low tone some simple prayer." Let me here refer the reader to Cushing's thrilling account of his journey from Zuñiland to "The Nation of the Willows." It may be found in the *Atlantic Monthly* for September and October, 1882, and should be carefully read by any one who has even a remote intention of visiting Cataract Cañon.

Once more we are in the saddle, and the sun is still blazing upon the eastern wall of our rocky prison when we reach the groves of willow and sycamore and hear the



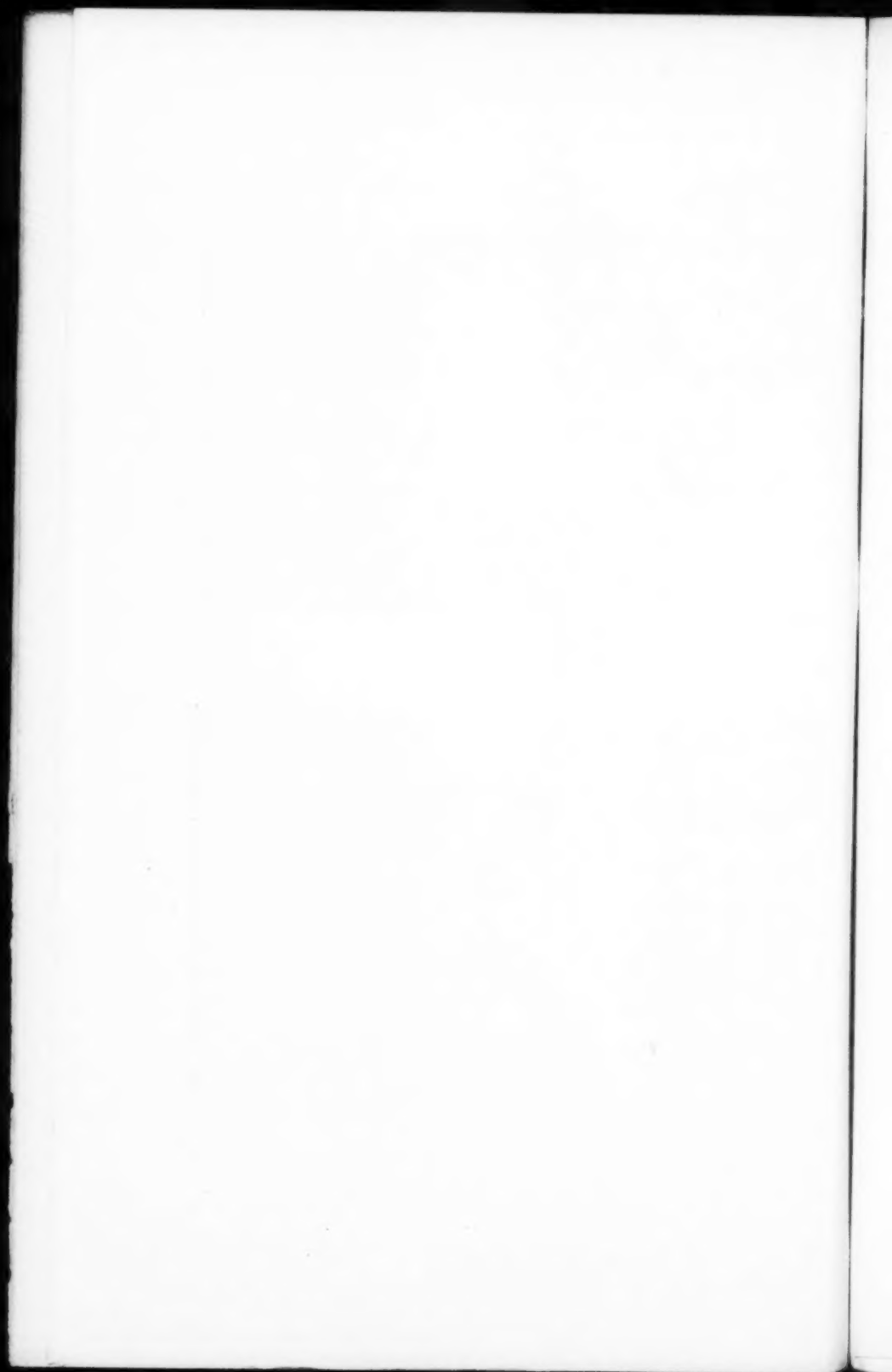
ILLUSTRATION 1.—SCENE ON HUALAPAI TRAIL, CATARACT CAÑON.

From a photograph by F. H. Maude.



ILLUSTRATION 2.—CRYPTOGRAMS, CATARACT CAÑON.

From a photograph by William A. Brewer.



laughing waters of the Havasu. The voices of children at play; the Indian ponies grazing here and there; smoke curling through the trees from some hut, or hogan; the tinkle of cowbells high up on the cliff; the voice of an Indian hallooing to his distant companion; the wistful faces of the natives who draw near with curious eyes; the glimpse of the stone schoolhouse and of the agent's home to be had by peering through the luxuriant foliage—these sights and sounds are welcome to us, as we unsaddle our beasts and watch them as they refresh themselves at the springs. The waters of the Havasu are at once the hope and the doom of the Havasupai Indian. From day to day they assuage his thirst, and from day to day they seal his inevitable fate. These waters come from far. Dashed perchance upon the Painted Desert from the bosom of some black thunder-cloud, or descending from the melting peaks of the San Francisco Mountains by some secret passage, they trickle down through the faults and crevices of the cross-bedded sandstone, finally meeting upon the unbroken surface of the underlying limestone. Then, following the subterranean slope, they emerge here at our feet. But they come forth heavily charged with lime, which accounts for both the wondrous blue color and the lurking doom. Our Havasupai brothers are short-lived, and nearly all of them die from causes brought on by this superabundance of lime in the water which they drink. The entire tribe numbers about two hundred and fifty souls, and the death-rate is much larger than the birth-rate. The exact figures were given me at the time, but I failed to note them down. My impression is, however, that in the twelve months preceding there had been only three births in the entire tribe.

The United States Government maintains a sort of branch agency here at the reservation, with a post-office (Supai) and three employees,—a school-teacher, a farmer,

and a teacher of domestic economy. J. H. Bratley, Charles Bushnell, and Miss Lou Goenawein held these offices, respectively, on the occasion of our visit, but before we left H. P. Ewing came into the cañon by way of the Hualapai trail, bringing with him Horace P. Wilson, who was to succeed Mr. Bratley as school-teacher. Mr. Ewing was at that time superintendent of both the Hualapai and Havasupai tribes, with headquarters at Truxton, Arizona. Mr. Bushnell, the farmer, was also preparing to take his departure, as his health had been seriously undermined by drinking the lime-charged water.

I have spoken of the Hualapai (or Walapai) trail. This is the only other means of access to the Supai villages. It comes in from the Hualapai reservation to the southwest, and I am told that it is in its way quite as rough and interesting as the trail by which we entered. (Illustration 1.) The mail goes in and out by this trail, and is carried by Indian riders. The Hualapai Indians are cousins to the Havasupais, though they have little to do with each other. One Hualapai, and one only, had married into the Havasupai tribe. He was a fat, good-natured fellow, but his life was something of a burden, for if anything went wrong in the tribe,—if a horse was poisoned or an orchard robbed,—the Hualapai was held responsible.

The Havasupai Indian, though not descended from the prehistoric cliff-dwellers, is troglodytic. He lives at will in the hogans, or brush huts, in the level bed of the cañon, on the land which he owns and cultivates, or, if the season of the year or some other exigency impels him, he moves with his family and household goods up the talus on either side of the gorge, and makes his abode in deep embrasures in the sandstone. (Illustration 3.)

For a stretch of three miles, beginning at the agency buildings, one sees these cliff-dwellings above the *ta'* as one rides in and out among the orchards and willows,





ILLUSTRATION 3.—HAVASUPAI CLIFF-DWELLING AND FAMILY CACHE.  
From a photograph by William A. Brewer.



ILLUSTRATION 4.—HAVASUPAI CACHE, CATARACT CAÑON.  
From a photograph by William A. Brewer.



or through the sandy but fertile fields that skirt the river. There are few actual cliff-dwellers to be found elsewhere in the United States, and I venture to say that the sight which I am describing is absolutely unique. Through all this country one comes upon the ancient granaries and cliff-dwellings, but they are desolate. Here, however, one sees these quaint and picturesque structures instinct with life. The children play and chatter in the sun, the squaws, in their bright-colored calicoes, move lazily about, while the lord and master, perched upon a rock, smokes his corncob pipe and stolidly contemplates the tenderfoot intruders.

Every family has at least one granary, or cache, and these (resembling huge beehives in appearance) are interspersed at random among the cliff-dwellings. In illustration 3 the cache may be seen in the center of the family home. In Illustration 4 we have a typical cache, which was at a distance from any Indian habitation, and probably near the field whose harvest it contained. In general I noted that the dwellings were to be found in the western wall of the cañon and the caches in the eastern wall. A cache is usually square, averaging perhaps ten feet by five in size, and is built of stone, liberally cemented with mud made of sandstone dust. Logs are placed upon the tops and the interstices filled in with the same mortar. The entrance is square, and is just large enough to admit the body of a squaw. In the harvest season she brings thither the corn, sunflower-seeds, squash-seeds, dried apricots, dried peaches, mescal, etc., and after all have been carefully deposited within, the entrance is filled with a square block of sandstone, and the whole sealed with a remarkably strong cement, made largely of bat's-dung, gathered from the clefts of the rocks. Before the cement has hardened the squaw marks it with her seal. In this instance (Illustration 4) the seal may be seen, though

indistinctly, at the lower part of the cement covering, and consists of the careful impression of the fore part of the squaw's left foot. Higher up, and on either side, one may see corn-husks, fastened into the cement and tied into knots that have definite significance. Above is a shred of red bandana handkerchief, which also tells its story to any wandering Indian that may come that way. Later in the year the cache is opened, and its store is used as the family needs demand.

I have said enough to show that the Havasupai Indian is a good farmer and well-skilled in irrigation. He doubtless learned much from John D. Lee, who, a fugitive from justice, spent two or three years in the cañon in the early seventies. Later he was captured and executed for complicity in the Mountain Meadows massacre. The squaws work in the fields, frequently carrying their naked children about with them while at work cultivating. But time will not permit me to speak of the many and interesting features of their life,—of their mescal pits, their basketry, their sweat-houses, their funeral customs, their tribal government, and so on. Moreover, a description of these things should come from the pen of a trained observer, rather than from that of a chance visitor.

In the frontispiece are shown two fine pillars of red sandstone, which the Supais reverence as gods. In their tongue they are called *Wig-li-i-wa*. Superstition has it that these gods—one male and the other female—get down from their bases at will and move about.

In conclusion, I should like to say something about the falls. There are five of them, the first of which (Havasupai Falls) are to be seen just below the villages and about three miles from the schoolhouse. About half a mile farther down we see the Navaho Falls. But both of these, though beautiful, give but a faint idea of the transcendent glory of the plunge that the waters make below, over the

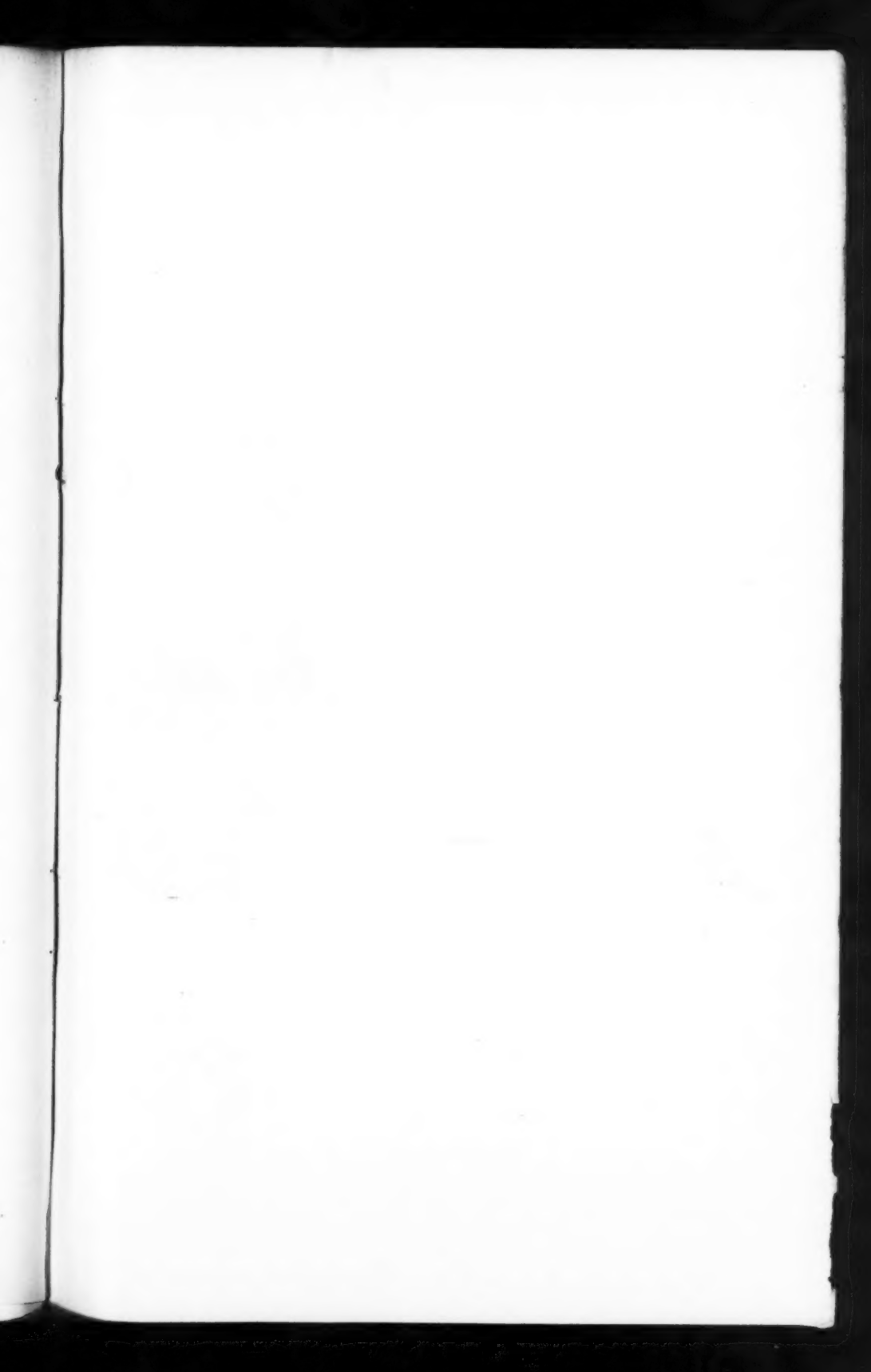




ILLUSTRATION 5.—BRIDAL VEIL FALLS, CATARACT CAÑON.

From a photograph by F. H. Maude.

Bridal Veil cliff of limestone. (Illustration 5.) Tourists pronounce it the most beautiful waterfall in the world. Cushing says, "It is useless to try to paint these falls with their crown of perennial verdure, their three hundred feet of crystal glory, their footstools of eternal circling rainbows, which sink far into the clear green depths of the fathomless pools, or rise on the clouds of mist, and turn to ashes and lime on the leaves of the trees around them."

We reached the foot of these falls by way of the steep, rocky path down Miner's (or Crematory) Gulch, leaving our horses on the cliff above; and while I gazed upon the superb, ever-changing lacework of this entrancing cataract my guide touched me upon the arm and bade me start for Mooney Falls if I would reach camp by nightfall. But I could not leave; and the time allotted to the falls below I gave to the scene before me. For that reason I cannot describe Mooney Falls to my readers, or the seldom-visited Beaver Falls, still further down the river. These, with the tragic story of Mooney's death-plunge, must be left for some other occasion or some worthier pen.

## MY TRIP TO KING'S RIVER CAÑON.\*

BY DR. JOSEPH LE CONTE.

From time to time, the yearning for camp-life and mountain scenery comes upon me and must be satisfied. Thus was it with me in the early days of June last. I had already camped many times in the High Sierra. I had explored all the famous regions from Yosemite northward; but I had not yet visited the finest of all,—viz., the King's River Cañon and the lofty peaks in that vicinity. My camping days cannot last much longer. I must see this region before I give up entirely; and it must, I suppose, be now or never. Every camping trip heretofore has been a renewal of my life. From every contact with Mother Earth, Antæus-like, I have risen refreshed and invigorated. The longing for open-air life and mountain glory, for roaring cataract and leaping fall, was again upon me. So, in spite of warnings of friends that the trip would be too hard for me, I determined to try once more.

I have just returned (July 20, 1900) from a six-weeks' camp with my son, J. N. LeConte, in the cañon, up Bubb's Creek, and onward to the crest of the Sierra at Kearsarge Pass, 12,000 feet above sea-level. My expectations have been more than realized. My health has been absolutely perfect. I enjoyed intensely every step of the journey, and in some parts, as we approached the summit, the exhilaration of spirit and exultation of mind was such as I

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\* Reprinted by permission from *Sunset*, October, 1900.

had not felt before for ten years. I *felt* as if I could climb the highest peaks, but, of course, I knew better than to try anything so foolish. I left that to the younger members of the party. I only went where my horse could carry me.

Our party consisted of four,—my son and myself, my daughter, Mrs. Furman, and Miss Helen Gompertz,—just the ideal number and the ideal constitution of a camping party. The drudgery was fairly divided. The wood-gathering, firing, and attending to horses and mules was undertaken by my son, the cooking, etc., by the ladies, while I was regarded as the guest of the party. Nowhere more than in camp does true womanly refinement show itself. In spite of the unfavorable conditions, our ladies never wholly lost that neatness and tidiness so dear to the heart of every true woman.

We started from Berkeley June 7th, 8:30 A. M., and reached Sanger the same day, 5 P. M. By special arrangement previously made we immediately took a night stage for Millwood. Stopping four or five hours at Dunlap's for rest and sleep and breakfast, we reached Millwood about 11 A. M. of the 8th, and started on the trail the same day. By this arrangement we gained one full day, and also avoided both the heat of the stage ride by day and the annoyance of a stay over night at Sanger and again at Millwood.

After some delay in getting things together, in packing and changing civilized clothing for "camp duds," we got off about 4 P. M.—my son Joe and Helen on foot and leading the two pack-mules, and my daughter and myself on horseback. Starting so late, our first day's journey was purely nominal—only to get away from the busy haunts of men to the peace of nature—from the heat and dust and turmoil of traffic to coolness and cleanness of forests. We, therefore, went only three miles and

camped. From Millwood to our camp in the cañon is about thirty-five miles. The usual time for pack-trains is two days. We were four days on the trail. We were detained every day by an afternoon thunder-storm and hail. I was not sorry for this, as it compelled easy stages and did not at all interfere with open-air sleeping. A small "A" tent protected our provisions, bedding and ourselves during the storm, which never lasted more than an hour or two and left the air fresher and the scenery more beautiful. Only once did we attempt to go on in the afternoon, and then we all got drenched. But he is no camper whose spirit does not rise with every discomfort and difficulty. That very evening was to me perhaps the most hilarious of the whole trip. As usual, nobody was any the worse for the soaking.

On the second day we passed through the Big Tree Grove, and here we had a striking object lesson on the necessity of reservations. The outskirts of the original grove was a scene of horrible desolation, ruin, and ugliness. The ground was strewn with the mangled remains of once grand sequoias—each one the growth of thousands of years. It was literally a slaughter-pen. As we passed on, next came the reservation line, and suddenly, as if by magic, all is beauty and grandeur and delight. I know that much may be said in justification of such butchery. It is true that forests were made for man, not man for forests; it is true that trees are for human use. But there are æsthetic uses as well as commercial uses—uses for the spiritual wealth of all, as well as for the material wealth of some. It may be, indeed, that commercial uses must take precedence of all other uses; but even here is a rational as well as a wasteful use, a use not only for now, but for all time; not for this generation only, but for all generations. The forests are the property of the nation. Generation after generation passes, but the



national life continues. As the wise man differs from the fool chiefly in thoughtful provision for the future, so a nation is wise in proportion as it husbands its resources, and uses them in such wise as to continue and increase them. Like the prodigal son, the nation has wasted his substance in riotous living, careless of the future, and only now, when nearly all is spent, is coming to himself and recognizing that trees also are a crop worth cultivating.

The Big Trees here do not occur in isolated groves consisting mainly of this species alone—as in Mariposa and Calaveras—but are more scattered among other competing species of conifers. But they are everywhere easily recognized by their smooth, brownish yellow, nearly cylindrical trunks, limbless for one hundred to one hundred and fifty feet. Some of them in this grove are magnificent specimens. The General Grant is, I think, the finest I have yet seen. It is certainly far more perfect, and probably larger, too, than the Grizzly Giant of Mariposa. We find abundant evidence here that the species is not dying out, as many suppose, but is still vigorous and successfully holding its own in the struggle for life with other species. Trees of all sizes and ages, from sprouting seedlings, vigorous saplings, stately monarchs, and decaying giants are seen on every side. It is true that at one time, several millions of years ago, sequoias were far more abundant and diversified in species than they are now (more than fifty fossil species are known) and also far more widely diffused (they prevailed at that time all over the northern parts of North America and Eurasia). It is true that during the glacial period they were pushed southward by the rigor of the climate far beyond their natural limits and all the species destroyed except two, and that these two on the retreat of the ice-sheet were left stranded here in California alone—the Big Trees on the slopes of the Sierra and the Redwood

on the Coast Range. It is true, therefore, that they are a mere remnant of what they were, and it is this, indeed, that invests them with so peculiar an interest; but where conditions are favorable they yet have every appearance of abounding vitality. Geologically, they may be called a dying species, as are also the Liquidambar and the Liriodendron of the East, but surely not in any sense of human chronology.

On the third day we got our first really fine view of some of the highest peaks—Mt. Gardiner, 14,000 feet high; Mt. King, less lofty, but whose Matterhorn-like peak defied the utmost efforts of the climber, until overcome last year by Prof. Brown of Stanford; and far beyond these, on the very crest of the range, the sharp, jagged, pinnacled, splintered peaks of the Palisades, the roughest, the most unexplored, and therefore the most enticing, region in all the Sierra.

On the fourth day we nooned at Summit Meadow, only a mile from the margin of the cañon, and could easily have pushed on and reached Fox, at the bottom of the cañon, that afternoon; but our King's River camp was six miles up the cañon—a long ride. Besides, there was the usual thunder-shower in the afternoon; so we determined to camp here and make an early start next morning and reach final camp by noon next day. After the storm we walked to the verge of the cañon and took our first view—a sunset view—both of the cañon itself and of the surrounding peaks, the goal of our desires. Barring the wonderful falls, the view will compare well with that of Yosemite from Inspiration Point or Eagle Point. Next day, down, down, back and forth, zigzag, 3,500 feet descent in three or four miles, to the floor of the valley. Here we found several houses, now deserted, and a rough and very precarious-looking suspension bridge across the river, put up by Mr. Fox of Millwood. After a little

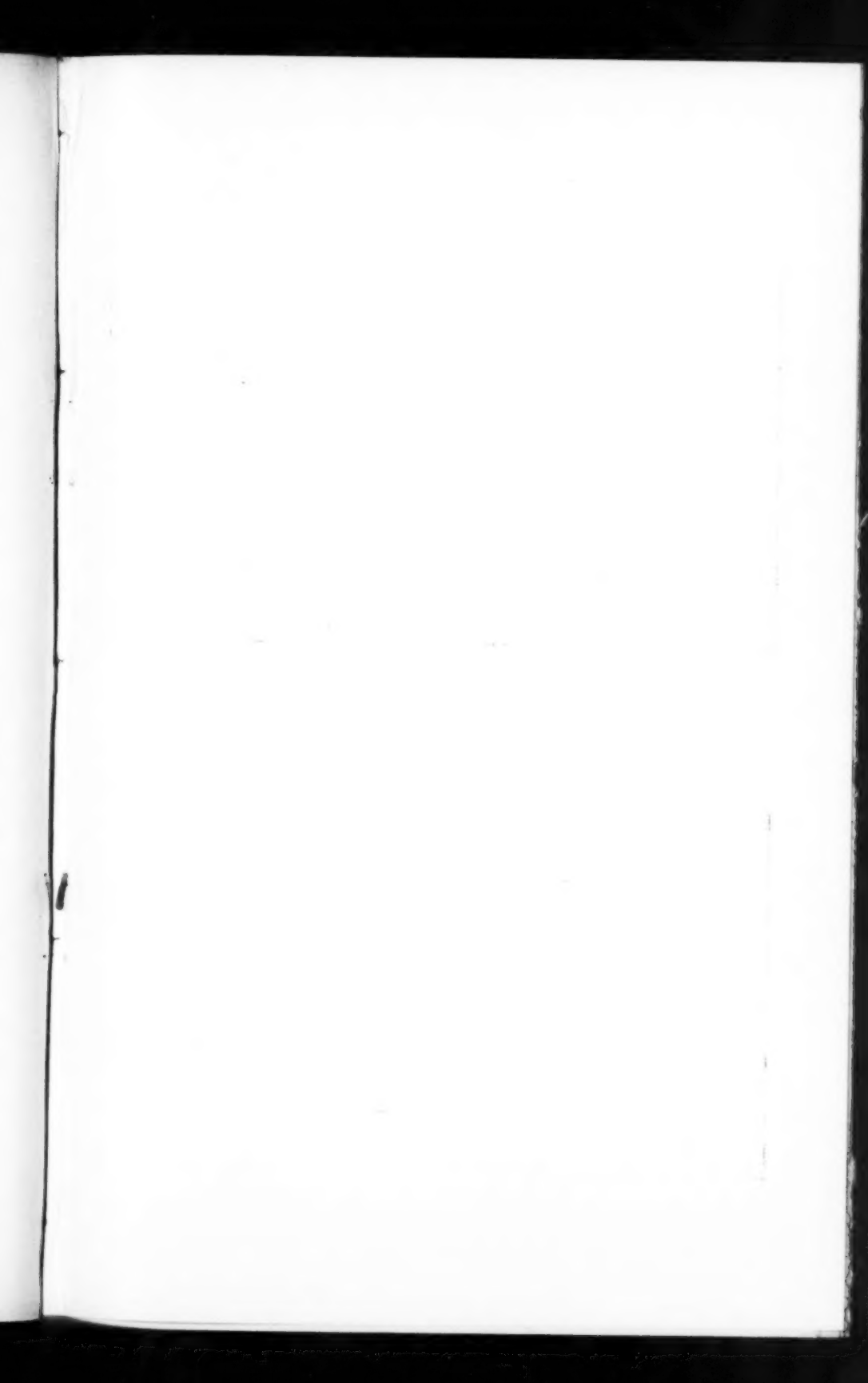
refreshment, and especially drinking deeply of the delicious water of the river, we crossed, one by one, the bridge, and easily reached our camp, six miles farther, by noon. The afternoon hail-storms continued two days after we reached camp, but after that the serenity was perfect all the time.

Our permanent camp, selected by Joe, was in a thick grove of pines on the very banks of the river and immediately beneath the highest peak—"Grand Sentinel"—of the walls of the cañon. This wonderful peak rises an almost sheer, vertical precipice 3,500 feet above the river. There is nothing in Yosemite finer.

Prof. Magee and his party had occupied our camp until a few days previously, when he moved up the cañon about one and a half miles. They left it in a neat condition, "swept and garnished," with rough table and seats and many other conveniences of which we were glad to avail ourselves. The river, swift everywhere, became, just below our camp, a roaring, foaming cascade which, by day, charmed us with its ever-changing form, and, by night, lulled us into deeper and sweeter sleep. In this delightful place we remained two weeks. It would have been tedious for the younger members of the party to have remained inactive so long. Every day or two they went off on some excursion while I kept camp. Sometimes they climbed half-way up the north wall in order to get a fine view of the more picturesque south wall. Sometimes they climbed the highest points of the south wall,—for, e. g., "Grand Sentinel," 3,500 feet. Sometimes they took longer trips, as, for example, to top of Goat Mountain, from which is obtained a magnificent view of the High Sierra. Sometimes they explored Paradise Cañon, the northern fork of King's River. These excursions would occupy sometimes a day, sometimes several days. Meanwhile I was left alone to struggle with the environment.

This was no hardship to me. To be alone with grand nature is no solitude. Sometimes I strolled down to the cascade just below the camp, or to the falls of Granite Creek, and would sit for hours studying the rock structure of this region and trying to solve the problem of the origin of the cañon, or else merely musing, day-dreaming, or even dozing, but always taking in great health-giving draughts of pure air and bright sunshine. Sometimes I strolled up the cañon and visited other camps—the Magees, the Hathaways, the Kanawyers. Often my daughter stayed with me. Then we took longer walks, or else took the opportunity to bake a fine batch of biscuits for the more adventurous when they returned.

At the end of two weeks we pushed on up the main cañon to the forks, then up the eastern branch—Bubb's Creek—and still onward to the crest at Kearsarge Pass, 12,000 feet above sea-level. The trail up Bubb's Creek Cañon is very steep and rough. I feared that the day's ride would severely test my strength, but, on the contrary, the scenery was so grand, and becoming grander at every step, the air so stimulating and cool, the continuous roaring cascade so exhilarating, that I was actually fresher at the end than at the start. Such is the influence of mind over body. Prof. Magee and his party had preceded us by three or four days, and now awaited us in a beautiful camp just below the falls of Bubb's Creek. They welcomed us with shouts, and also more substantially with abundance of delicious trout for dinner. We camped with them that night and the next forenoon, and they went on with us in the afternoon of the 28th. The distance to Kearsarge Pass is only about ten miles, but the grade is very steep and the trail very rough. We therefore took it by very easy stages, stopping over night at "Vidette Meadow," a beautiful place overlooked by the two splendid peaks, North and South Vidette. Next





VIEW FROM KEARSARGE PASS.  
From a photograph by J. N. Le Conte.

By permission of *Siwest*.



MT. BREWER FROM BULLFROG LAKE.  
From a photograph by J. N. Le Conte.

By permission of *Siwest*.

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day we easily reached Bullfrog Lake, and made camp within a mile or two of Kearsarge Pass.

On the whole way up Bubb's Creek to Kearsarge Pass the trail becomes steeper and rougher, cascades and falls more frequent and more beautiful, and the scenery grander and more impressive, until finally, as we approached the summit, I could not refrain from screaming with delight. The mountain splendor reached its climax at "Bullfrog Lake" (a most unromantic and inappropriate name, but a glorious place). After making camp and a hasty lunch here, we went on with Professor and Mrs. Magee about two miles to the Pass, about 12,000 feet above sea-level. Here on the bare rock (for it is above timber line), on the sharp knife-edge of the Pass, with barely standing-room for two or three persons, in the midst of an unrivaled panoramic view, with the eastern plains spread out as a map 8,000 feet below, and only ten miles distant, and the highest peaks of the Sierra standing about us as silent witnesses, we took leave—somewhat dramatic leave—of Prof. Magee and his party, they going down by steep grade to Independence, and we back two miles to our camp on Bullfrog Lake. We watched their diminishing forms as they descended the steep grade, winding slowly around a little frozen, glacial lake nestled in a rock-basin immediately below us, almost at our feet, until they disappeared from view, then turned regretfully about and descended to our camp.

At this beautiful place—the most beautiful I have yet seen in the Sierra—we camped nearly a week. The lake, 11,000 feet above sea-level, stands in an amphitheater completely surrounded by the highest peaks of this the most alpine portion of the Sierra. On the east, the sharp, jagged, castellated, pinnacled, splintered peaks of Kearsarge; then going round southward, the symmetric, conical, towering form of University Peak, 14,000 feet high,

then Stanford Peak equally lofty, and Mt. Keith still loftier, 14,200 feet, then the fine outlines of the Videttes; then southwestward the grand, massive form of Mt. Brewer with its great cirque filled with snow, from which emerges a fine glacier. On the northwest Charlotte Peak, with Charlotte Lake at its foot, and all the fine peaks of the Sierra in panoramic view from its summit. Several of these peaks—Charlotte Peak, Mt. Keith, etc.—were ascended by the younger members of our party, while I kept camp and strolled around the lake enjoying the incomparable scenery.

About July 4th, we started back, stopping a few days at our previous camp at Vidette Meadow, visiting the beautiful falls at this point, and climbing some of the neighboring peaks, and then returned to our camp in King's River Cañon, July 9th, after an absence of two weeks. These two weeks were the most delightful of our whole trip. I could not have imagined that I could still enjoy anything so much. I felt an exhilaration of spirit such as I did not believe possible. It was a real renewal of my vitality, and to some degree of my youth.

Such is a brief account of the trip—too brief, I fear, to bring out the real spirit of camp life. But there are some points on which I must dwell a little more. The reader will naturally ask, "How does King's River compare with Yosemite as to origin, as to beauty, and as to the pleasures of camp life?"

1. *Origin.*—There can be no doubt that King's River Cañon belongs to the same type as Yosemite and Hetch-hetchy. They are all Yosemitees,—i. e. valleys with vertical walls and flat floors, as contrasted with the usual V-shaped valleys of mountains generally. In King's River the walls are equally high and equally vertical, and the floor similarly, although not equally, flat. In both cases, too, the exceptional verticality is due to a similar rock-



structure, viz., a vertical rock-jointing or rough rock-cleavage, characteristic of the granite in these regions, and even more conspicuous about King's River than at Yosemite. The concentric, onion-like structure which determines the domes is seen here also, as in Yosemite, although the resulting domes are not so numerous and symmetric. In both cases the main cañon divides into two great branches—the Tenaya and the Vernal-Nevada branches in the one case, and Bubb's Creek and Paradise Cañons in the other. In both cases, too, the grandeur of the cliffs reaches a climax just where the main cañon and the branches meet. In both cases the marks of glacial occupancy are visible, but these are far more conspicuous and on a grander scale in King's River. There can be no doubt, therefore, that the origin or mode of formation of these cañons is the same. For my views on this much-discussed subject I must refer the reader to an article entitled, "Transverse Mountain Valleys," etc., in the *University Chronicle* for December, 1898. To discuss it here would carry us much too far afield.

2. *Scenic Beauty.*—Doubtless, for aggregation of striking features within a limited area, and especially for the splendor of its many waterfalls, Yosemite stands unrivaled, not only in California, but in the world. But there is a peculiar, though gentler charm, also, in the foaming rapids so characteristic of King's River and its branches. If Yosemite is far superior in its falls, and also in its extensive meadows and the variety of its foliage, King's River is far superior in its surrounding mountain scenery. King's River Cañon branches and re-branches, becoming deeper and wider and grander until it deploys and loses itself among the highest peaks and grandest scenery of the Sierra. Taking one typical example from each region, the scenery about Tuolumne Meadows is not to be compared to that about Bullfrog Lake.

3. *Healthfulness.*—In this regard I believe the King's River Cañon is much superior, because it is drier. The fall of the Merced River in the Yosemite proper is only about eight feet in as many miles. In the same distance the King's River falls about five hundred feet. I have always been perfectly healthy in camp, but it seems to me I was especially so in this camp.

4. *Pleasures of Camp Life.*—The true camping party is sufficient unto itself. The camp life is a complete contrast with the conventional life. Its delight consists in being for a time away from the busy haunts of men and alone with untamed nature. The true camper prefers that there be no other party near. Other campers, a mile or so off, and an occasional visit, if they are good campers, are well enough, and even, perhaps, increases the pleasure, but are not necessary. In this I need hardly say King's River is infinitely superior; nature there has not yet been defiled by the presence of man. In early days, when I first visited it,—i. e. in '70 and '72, when you could not get into it except by trail,—Yosemite, too, was pure and undefiled, but now it is overrun with tourists and sophisticated with conventional fashions. In King's River, and especially in Bubb's Creek Cañon and Bullfrog Lake, we find only absolute nature, unmodified except by the roughest trails possible for mules. Both in healthfulness and in the delights of solitary companionship with grand nature the King's River region is now the ideal camping-ground.

5. *Game and Fish.*—But many men go into camp mainly for hunting and fishing. I fully sympathize with this passion, for I too have been a "mighty hunter" in my time. I now enjoy the mountain scenery more, although I confess that the fruits of the hunting and fishing are not without a certain charm when suitably prepared and served. For those fond of fish and game (and who

are not?) King's River is the place. Hunting is, of course, forbidden in Yosemite, and properly so. Fishing is allowed, "catch who catch can," but I confess I never could catch any. They are scarce and shy. But in King's River region the mountains are full of grouse and mountain quail, and the streams abound in trout. Although not seeking them at all, my son got ten grouse. Again, although we spent little time in fishing, we had all the trout we wanted. They were especially abundant and fine as we went towards the head-waters,—i. e. in Bubb's Creek, and especially in the little streams running into Bullfrog Lake from the melting snows of the summit peaks. Nor was big game wanting. Without turning at all out of our way we saw both deer and bear, but brought home no trophies of buckhorn or bearskin. The ladies, however, had their trophies in the way of six or seven rattlesnake-skins, of which they will make ornamental belts.

## CONIFERS OF THE PACIFIC SLOPE.

## HOW TO DISTINGUISH THEM.

BY JOHN G. LEMMON.

## No. III.

Our first number treated of the general classifications of the great Order of Coniferae, followed by groupings and descriptions of the largest subtribe, THE FASCICULARS,—trees having their leaves in fascicles, or little bundles. It comprises the Pine, Larix, and true Cedar families, composing over one third of the cone-bearing trees.

The second article continued the classification, grouping and describing the other subtribe of Northern pitch-trees, —THE SOLITARES,—trees with leaves solitary and very short, comprising the Spruce, Hemlock, and true Fir families. This group was followed by a discussion of the TAXÓDIADS, the cypress-like trees of both hemispheres having, generally, small scales for leaves, but they, as well as the cone-scales, are spirally arranged. They include our world-famous Redwoods.

There remains to be described in this paper the third and last major group—

DIVISION II. —CYCLALES—THE WHORL-  
CONE TREES—CYPRESSES AND THEIR  
ALLIES.

Unlike the preceding trees, which have spiral development of their organs,—i. e. their leaves and bracts arise in spirals about the branchlets, the cone-scales being sim-

ilarly coiled about the cone-axis from base to apex,—these whorl-cone trees have their foliar and fruit organs arranged either in pairs, and so opposite, or they are in threes, and so are in whorls, or circles. Also, the leaves are very small and scalelike; the cones are small, oblong, or globose; the scales valvate or peltate, or club-shaped.

The Cypresses comprise in America, two pairs of closely allied genera.

FIRST PAIR.—American Cedars, with cones oblong or elliptical, and scales flat and convex; branchlets fanlike in their arrangement; leaves in pairs of two forms and decurrent.

1. *Thuja*.—Fertile cone-scales six, unequal, thin.

2. *Libocedrus*.—Fertile cone-scales two, equal, thick.

SECOND PAIR.—The Cypresses, with cones globose, the scales very thick, obpyramidal, and peltate, or club-shaped; leaves in pairs, two-ranked.

1. *Chamaecyparis*.—Branchlets pinnate and fanlike; cones maturing in one season; seeds few and winged.

2. *Cupressus*.—Branchlets, scattered; cones larger, maturing in two seasons; seeds numerous and wingless.

SLOW GROWTH OF THE CYPRESSES.

The celebrated botanist Michaux wrote of the Cypress: "The concentric rings are more compressed near the center, an arrangement that is contrary to that observed in the oak, maple, ash," etc., a statement which is not quite correctly stated, since the annual layers, which he calls "rings," are not "compressed near the center," but are simply formed in thinner layers in these trees while young than in the broad-leaved trees. It may be stated in this connection that, in general, for a series of years a tree increases both in amount of foliage and size of trunk;

hence during this period the equality of thickness is maintained. Trees in a forest, however, usually have to dispose of their lower limbs,—they are not “tolerated,” or the tree needs their quota of sustenance, to be applied to the upper, aspiring limbs, which are borne as a crown, rising higher and higher, while the trunk must increase in strength to resist the wind; but the annual output of woody fiber must be spread over a larger surface, and consequently must be thinner—an important consideration to the lumber manufacturers.

When age and decrepitude ensue, the foliage and lignum are still further reduced, and, as in the case of our aged, storm-beaten Monterey Cypress, and the snow-laden Juniper of the High Sierra, they often show but a few green twigs annually, the annual layers being discoverable only with a magnifier. And often another peculiarity occurs: In the economy of the tree it is only found possible to supply the new material to the surface of a few ribs, connecting certain large roots to certain large limbs, thus completely changing the appearance of the tree, rendering it a fluted column.

#### FIRST PAIR.—AMERICAN CEDARS.

##### TREES WITH OBLONG FIBROUS (NOT WOODED) CONES.

1. *Thúya* (the Arbor-vitæ trees).—The name of this genus is of ancient Greek origin, meaning fragrant gum or resin, and it is spelled variously, Thuja, Thuia, and Thuya. As the letters *j* and *i* are sounded like *y*, it is quite as well to spell the name *Thuya*. The Latin words “Arbor-vitæ” refer to their resemblance to the appearance observed in cutting the human cerebellum through in a vertical direction. This distinction early separated them from the rest of the Cyresses, and later these were again separated into genera, leaving but a few species under this name.

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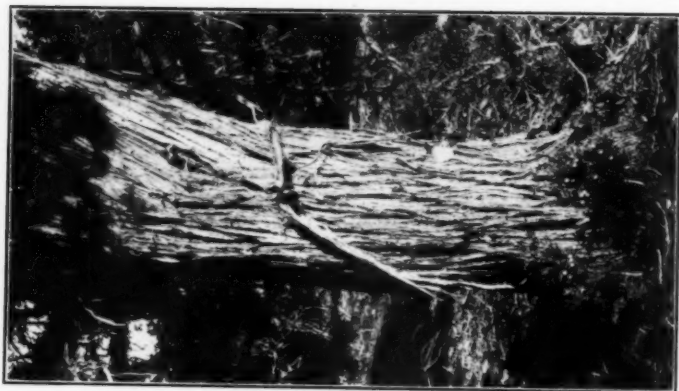
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INCENSE CEDAR.  
*Libocedrus decurrens*, Torrey.  
From a photograph by J. G. Lemmon.



BONITO CYPRESS,  
*Cupressus Arizonica*, Greene; var. *Bonito*,  
Lemmon.  
From a photograph by J. G. Lemmon.



COSNING JUNIPER.  
*Juniperus Cosningi*, Lemmon.  
From a photograph by J. G. Lemmon.



Of American species, one is indigenous to the Eastern States from New Brunswick down along the Alleghany Mountains to North Carolina, and westward to Michigan. The Western species (*Th. plicata*, Lam.) inhabits the coast region from Alaska southward to Cape Mendocino, and the cross-ranges eastward to the western slope of the Rocky Mountains.

These two regions nowhere approach each other nearer than a thousand or fifteen hundred miles, but the differences between them are so slight that Robert Brown conjectured that perhaps the separation has been recent.

"There lies something deeper behind this dispersion," he remarked, "than we yet understand, and it really seems sometimes that a species may stretch to the utmost bounds of its range, cross over, and take new characters to suit the new climate and physical circumstances to which it is subjected, and here in the new position change characters to suit necessities, and form a new race. The want of stragglers all the way over [he continues] seems to militate against this theory" and he would fain support his position by assuming "the great central regions of America, like the center of all continents, now too dry for the growth of trees, may not have always been so." And he cited the remarkable resemblance that subsists between half a dozen species in each of these divisions, scarce a prominent Atlantic species of conifer but has its Pacific "analogue"; but the Pacific region has by far the most lines of development present and unmatched, as in most of the Pines and Firs, and, most notable, the two giant Redwoods,—nothing like them being found elsewhere on the earth.

The Eastern species (*Th. occidentalis*) forms the major part of the cedar swamps of that region. The tree usually tapers from a swollen base of large size to a point at no great height, the limbs wide apart and spring-

ing out at right angles from the body, each with drooping, sweeping branches. The white bark has gained for it the name of White Cedar, but the wood is reddish, and the better name is Atlantic Red Cedar. It is often called *Arbor-vitæ*; but that name better be reserved for the little compact Chinese trees, the *Biota*, with flattened, vertical branchlets, and which are found so often in cultivation as rounded clumps in our yards and parks.

1. **Pacific Red Cedar, Giant Arbor-vitæ** (*Th. plicata*, Lambert; *Th. gigantea*, Nuttall).—This is the Pacific analogue of the Eastern species, and for a long time was confounded with it; but it is found to be specifically separated in many respects, particularly in its enormous size, trees around the Puget Sound often attaining a height of one hundred and fifty feet with a diameter of ten to twenty feet.

With headquarters in the low, rich woods and swamps of the Washington coast, it extends northward to the islands of Alaska, and southward to Cape Mendocino. In British Columbia it forms a great part of the forest, dividing the privileges of the great rainfall there with the big Tideland Spruce, described in a former paper. It follows along on the wet spots of the northern cross-ranges through Northern Idaho and Montana to the western slopes of the Rocky Mountains, where at high elevations it becomes dwarfed and was there mistaken for the Eastern species. In its headquarters around Puget Sound, may be found trees of magnificent proportions, straight, tapering, tall, with the upper third clothed with bright green foliage.

A noted tree a few miles south from Seattle was utilized by the Hudson Bay Company in the early days of Western occupation for a telegraph pole, and until the discovery of the giant Sequoias later, this tree was doubtless the larg-

est telegraph pole in the world,—being over fifteen feet thick at the base.

The limbs of the *Thúya*, with two-ranked branchlets, forming horizontal sprays of fanlike foliage, and other characters of the species, cause it to be mistaken for the next tree to be described,—*Libocédrus*,—and in descriptions by early explorers the two trees were often confounded, but for certain identification reliance may be placed on the characters of the fruit. The cones of this Red Cedar are small,—scarce a half-inch long at maturity,—turning upward from the edges of the sprays of foliage; the thin scales are much alike, except that the six central ones are larger, bearing the seeds; also the range of the two trees is totally different, the Incense (or Post) Cedar being confined to higher and dryer localities of Southern Oregon and throughout California.

"As a useful tree," wrote Robert Brown, "it stands pre-eminent in the Northwest for its use as a shingle-tree, vast quantities being manufactured annually. The aborigines prized it very highly. They used this light, soft timber in many ways,—for canoes, walls for their lodges, for troughs, bowls, etc., while from the strong bark they make clothing, mats, and blankets. Their lodges were thatched with this material. . . . Nothing so thoroughly expresses the enormous size of the tree, its lightness and durability," continues Mr. Brown, "than to see the large war canoes which the Indians fashion out of their trunks, often forty to sixty feet long, and holding forty to fifty warriors."

In preparing to cut down one of these large trees, our modern lumberman, who does not desire the hollow lower portion, cuts notches in the sides for his feet in climbing, then at a point above "the swell" he digs a square hole to a depth of a few inches, in which he inserts the narrowed end of a stout plank, shod with a strong, curved

iron shoe, that, when the plank is depressed, grips into the tree and makes a firm and safe footing for the workman.

The timber of this gigantic cedar is well-nigh indestructible in contact with water, as remarkably exhibited at Shoalwater Bay on the coast of Oregon, where submerged trees of this species are standing in groves whose ages must compass many centuries. They are known to be identical with existing species, the nearest trees being the same. The slow sinking of the coast seems to be still proceeding, the tide rising higher and higher from decade to decade, killing the trees which remain perfectly sound, the uncovered portion becoming well-seasoned and of great economical value.

The shingle industry of the Northwest, with its scores of manufactories, employing thousands of workmen, and yielding millions upon millions of revenue annually, is derived from this rare local tree.

2. **Incense Cedar, Post Cedar** (*Libocédrus decurrens*, Torr.).—One of the most beautiful trees in California, especially along the western slope of the Sierra. Usually found in open situations, where, preserving every limb in health, it forms a perfect cone of verdure (as on the floor of Yosemite Valley), but in forests, where it must divest itself of its lowest limbs, it rises in a smooth yellowish or whitish column, one hundred to one hundred and fifty feet, with a diameter at base of four to six feet. The limbs, quite numerous in youth, bear their branchlets in two ranks, making flat, almost horizontal sprays of dark-green foliage. The cones are about the size of a child's thimble, and are pendent from the side pinnæ of the principal branchlets. They are long-oval, about an inch long, composed of three pairs of very unequal scales, the lower short and sterile (often absent), the mucro, or point, resembling a spur, the middle pair greatly developed and expanded to the full length of the cone, thickened so as

to form the greater part of the cone, and bearing on their inner faces the four seeds, a pair on each scale. The pairs of seeds, each with two wings, are separated from each other by a septum, or partition, composed of the third pair of scales greatly modified and sterile, with their edges in contact—forming the partition. Surmounting all, at the apex of the cone there is a pointed vestige of the fourth pair of scales.

The seeds are oblong, four to six lines long, unequally two-winged, the outer wing but little longer than the seed, the inner broad and long, nearly equaling the scale.

The branchlets are at first flattened horizontally and clothed with small scalelike, pointed leaves, their bases prolonged downwards suggesting the specific name (*decurrens*), the alternate pairs of scales smaller, their bases half-concealed.

The male flowers, numerous, and terminating the branchlets, are ovate, three to four lines long, yellowish and composed of twelve to sixteen scales, with four globular anthers beneath each.

The geographical center of the Incense Cedar, is in Central California, on the western slope of the Sierra Nevada, thence extending to Southern Oregon and southward to near the Mexican line. In the Sierra it flourishes at elevations of 4,000 to 6,000 feet, in Oregon a thousand feet lower, in Southern California as much higher, everywhere preferring dry, open situations for the display of its graceful spires of dark-green verdure. It never crowds other trees, nor is it set closely in a forest, it being one of the intolerant trees.

Though very valuable in its best estate, the timber is often attacked by a fungus, called "dry rot," that enters the tree from the roots. It attacks the cell contents of the wood and kills large sections in rounded masses, reducing the wood to brown, powdered, cinderlike refuse, disposed

in long chains, often from base to top. Trees affected by "dry rot" lose the bright appearance of the bark, which becomes reddish and dingy, giving notice to the timber-cutter of its porous condition. The timber splits readily, and sound trees make excellent finishing lumber. Variegated boards made of the dark-red heart-wood, bordered with a stripe of the white sap-wood, being a great favorite for ceilings, wainscoting, and cabinet-work.

Every part of the tree is aromatic, the timber so pungent that a shaving chewed will seriously affect the mouth, like a burning fluid. Upon the slightest abrasion or application of working-tools, this peculiar cedar gives off a delightful perfume, which suggested the generic name of *Libocédrus*, meaning "incense cedar."

The Incense Cedar has been a great boon to the California farmer and stockman, their first improvements being largely aided by selections of cedar from the nearest forest. Trees may be split from end to end with an ax, the sections then used for fencing, which endures many years of weathering. For posts it is invaluable, being almost imperishable.

When these lovely trees are fruiting in the autumn, and their numerous yellowish-brown pendent cones are ripening, their appearance adds a charm and attraction to any landscape. In the long chain of sub-alpine valleys, beginning with Yosemite, and including Tahoe, Sierra, American, Indian, Big Meadows, and Lassen Valley, lying near the vertebræ of the Sierra, the Incense Cedar, with its graceful form and bright foliage, becomes a never-to-be-forgotten feature of the scenery.

There are three other living species of *Libocédrus*,—one in New Zealand, one in Chile, and the third in Patagonia. The researches of geologists reveal that several species existed in far northern regions during Miocene times, coeval with Sequoias, Taxodiums, Magnolias, and the

like, all seemingly of colossal proportions, like the animals of the period.

SECOND PAIR.—THE CYPRESSES.

Trees with globular or sub-globular, woody cones, the scales six to twelve, rigid, valvate, peltate, or obpyramidal. Two genera.

FLAT-BRANCHED CYPRESSES.

Very graceful northern trees; branchlets forming flat horizontal sprays of foliage, the leaves two-ranked; cones globular, very small, one-quarter to one-half inch thick, maturing in one season; scales semi-woody; seeds few, narrowly winged.

We come now to the consideration of a very ornamental group of trees composed of two families on opposite sides of the Northern Hemisphere, one genus, of ten species, in Eastern Asia, the other, of three species, in North America. No trees of other groups excel these in gracefulness of form, the branchlets carrying out the flat-branched character of other trees described, to the farthest degree of symmetrical perfection.

In open situations all the limbs are retained, diminishing gradually in size from bottom to top of the tree, which usually terminates in a slender shoot, turning at the point and swaying with every breeze. The light-green foliage of the lower branches bear their convex fans decorated on the edges with minute beadlike purple globes—becoming brown at maturity—the male flowers.

This group was taken out of the large family of *Cupressus* in 1842, on the several points of having their branchlets in two ranks, the cones maturing in a single season, the scales thin, and bearing but two or three seeds each, these being slightly winged,—leaving the True Cypress, a compact genus, with branches spirelike or plumelike, the cones requiring two seasons to complete

their growth, the scales thick, woody, and bearing numerous wingless seeds.

Some of the Old World species of True Cypress are small shrubs or trees, the pride and pets of the tree-loving Orientals of Japan and China. Many of the trees can be kept so small, by tying back the branches, that they make charming house-plants, specimens a hundred years old being but a few feet high. These little shrubs are conveniently carried about in pots or boxes, as is the custom of the mandarin, who often, upon occasion, arranges his garden in very different, not to say grotesque, forms, as the fancy dictates or custom requires.

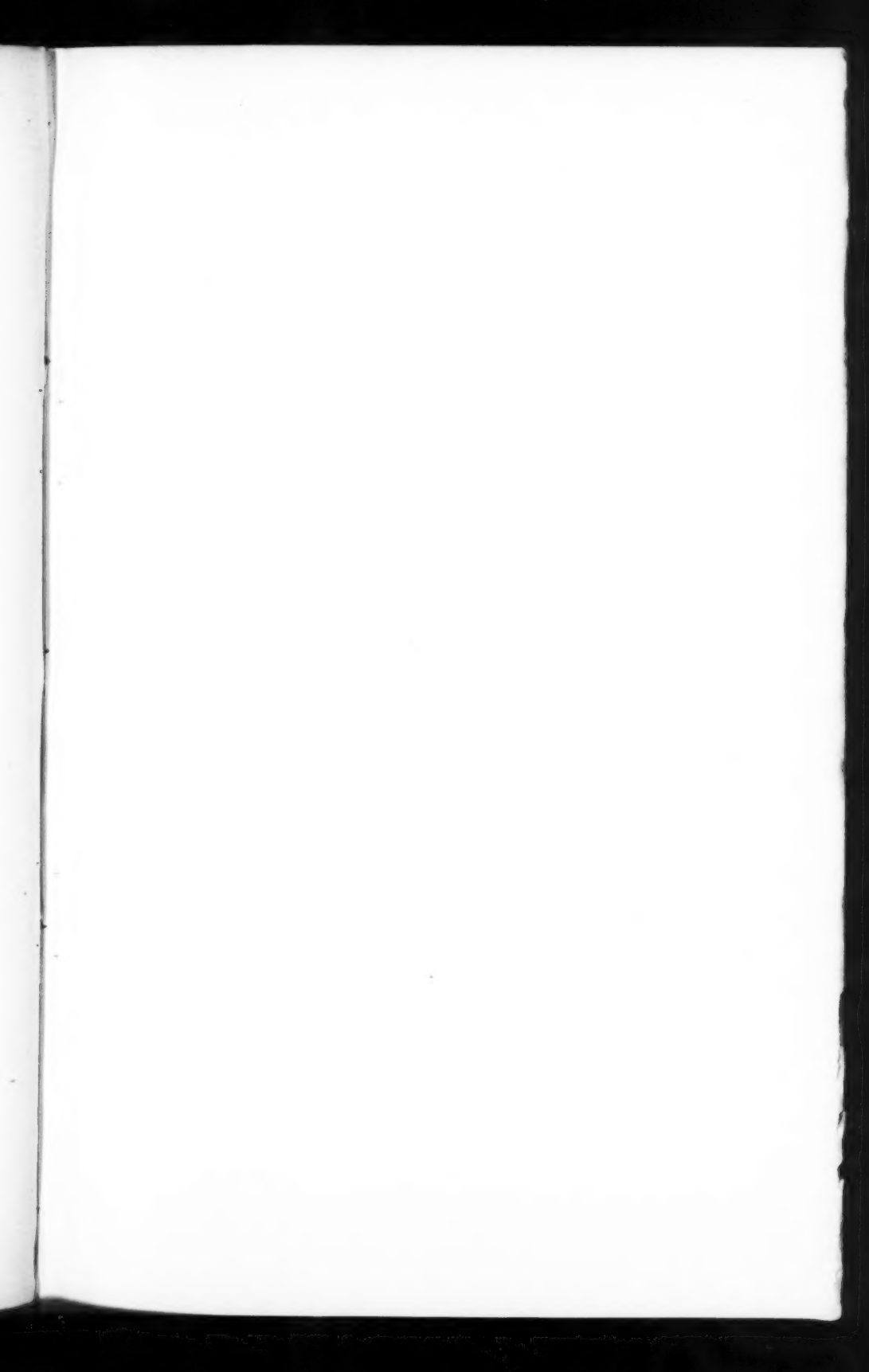
Other species become very large trees, as the great Japan Cypress, constituting the greater part of the forest of Nippon. It often attains the height of one hundred feet. The timber is so very white, firm, aromatic, and fine-grained, that, with a brilliance under polish like satin, the Japanese prize it above all other woods, making their most valuable furniture, as well as constructing their temples and idols of it. They also—to their praise be it said—set apart certain of the striking trees, exempt them from destruction, and dedicate them to the sun-god, under the name of *Fusi-noki*—"Tree of the Sun."

#### AMERICAN GENUS, *Chamaecyparis*.

(Name from the Gr. *chamæ*, on the ground, and *cyparis*, the Cedar,—i. e. Ground Cedar, the first trees discovered being low, with spreading branches.)

This genus is indigenous to America, the Eastern States having one species (*Ch. thyoides*), found in cold dense forests from Maine to Mississippi. It is especially at home in the Dismal Swamp of Virginia, sharing the loose sphagnum bottom with the Bald Cypress, where, growing thickly, the shade is so dense as to preclude the sunlight, and the trees there trim themselves to a great



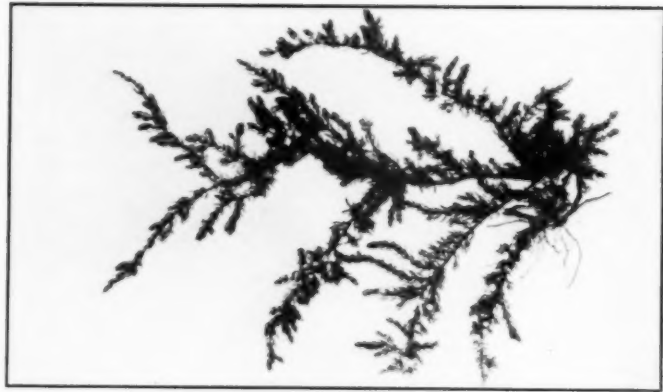




LAWSON CYPRESS.  
*Chamaecyparis lawsoniana*, Parl.  
From a painting by Mrs. J. G. Lemmon.



MONTEREY CYPRESS.  
*Cupressus macrocarpa*, Hartweg.  
From a photograph by J. G. Lemmon.



ALPINE CREEPING JUNIPER.  
*Juniperus communis*, L.; var. *Siberica*, Rydberg.

From a photograph by J. G. Lemmon

height. Wood very fragrant, white, soft, durable, and much used in manufactures.

The forest development of the Northwest contains two species of these peculiar trees,—one northward, around Puget Sound, the other southward, and quite local.

1. **Alaska Cypress** (*Ch. Nootkatensis*, Spach.).—This species extends northward to the islands of Alaska (where it was first detected on Nootka Island, whence the name), and southward it reaches Santiam River and Mount Jefferson in Oregon. A fine grove has been found in the Olympia Mountains, and a smaller one on the south slope of Mount Rainier. At its best the Alaska Cypress becomes eighty to one hundred feet high, with a diameter of three to five feet. The branches are apt to be short and drooping, the branchlets less often horizontally flattened; the cones are larger than those of the next species, with four to six scales, which are greener and more convex, with a more prominent boss on the center of the thickened apex.

The wood is light, hard, close-grained, easily worked, durable, and of a satiny sheen under polishing tools; in color a bright, clear yellow, this fact winning for the timber often the name in commerce of "Yellow Cedar."

2. **Lawson Cypress** (*Ch. Lawsoniana*, Parl.).—Pre-eminent among ornamental trees the world over is this graceful denizen of an extremely local region of the coast of Southern Oregon, with a few trees reaching California. No tree is better known or more highly esteemed, it would appear, from the diligence with which the seeds are still collected for the Old World markets, and the abundance of its presence in our parks and pleasure-grounds.

The Lawson Cypress is distinguished at sight by its perfect conical form, the numerous limbs bordered on each side by the alternate pinnæ of branchlets, thus form-

ing the nearly horizontal, fernlike fans that so eminently characterize this tree. These branchlets, first horizontal, then slightly descending, with convex surface, exposing its bright-green foliage, decorated along the border with little royal purple globes that late in September become brown and burst into a minute burr, scattering its many seeds. The tree is distinguished from a distance by its top; the upper limbs diminishing, the tree ends in a tall, slender shoot, nodding and swaying with every movement of the air.

This family of trees may not be clipped by the pruner's shears, as happens to the True Cypress, without injury, for the half-remaining fans die back to the limb, disfiguring the tree, but the trees, on account of their dense foliage, make serviceable windbreaks; however, they are best displayed alone, with plenty of room in open ground.

Formerly the Lawson Cypress was abundant in a limited region around Coos Bay, on the southern coast of Oregon, but the lumberman's ax and forest-fires have removed most of them. The shipment of the valuable timber from the only port of the region—Port Orford—won for it the early name of "Port Orford Cedar," and the late Dr. Kellogg used to speak of it as "Ginger Pine," in allusion to the spicy fragrance of every part of the tree.

A few scattered groves are found southward along the coast until the redwood forest is met with, a few overlapping trees as far southward as Mad River, California. Eastward a few trees are found along Cow Creek, in Oregon, and the upper waters of the Sacramento, near Sisson. Trees may be seen from the rail-cars in Duns-muir Cañon, and quite a fine grove forms the Scotch Camp, twenty miles westward of Sisson's Tavern, celebrated in the early days as the resort of bear-hunters and trout-fishers.

The Lawson Cypress in the vicinity of other trees

becomes a straight, tall, limbless tree, affording excellent timber of a light cream color, with a silken gloss, and its aromatic odor, so delightful to the human sense, is offensive to insects—so for cabinets, clothes-presses, and wardrobes, etc., this tree is invaluable.

Of late almost the entire output of lumber produced by this disappearing tree is used in the manufacture of matches, and it is the spicy fragrance of our matches that at once arrests the attention of visitors.

Foreigners regard the Lawson Cypress as one of the most valuable trees introduced from the New World, as it seems to thrive in many different situations, always having a bright-green appearance, and always making a generous display of its lovely depending and decorated plumes.

#### TRUE CYPRESSES.

*Cupressus* (early Greek name of the Cypress).—After taking the above genera away from the old ante-Linnæan genus of *Cupressus*, quite a distinct and compact group of species remains, distinguished as trees and shrubs; having their branches scattered, not in two ranks; leaves very small, scalelike, opposite in pairs, and forming four ranks along the ultimate branchlets, so that they appear quadrangular; cones globose or oblong and polyhedral, of divergent obpyramidal and peltate scales, the cone requiring two seasons to complete its growth; seeds six to twenty above each scale, angular and narrowly winged; cones decidedly woody.

There are on the Pacific Slope five or six species of Cypress, three of them in California, and early discovered, the others inhabit southern regions, and were detected but a few years ago. There are two groups:—

#### GROUP I.—CALIFORNIA CYPRESSES.

1. **Monterey Cypress** (*C. macrocarpa*, Hartweg).—The coast-loving trees of the Monterey coast, from

Cypress Point to the south shore of Carmel Bay, and northward to Point Lobos. These are justly celebrated trees the world over. Thousands of visitors to the Pacific Slope have visited Monterey and taken the seventeen-mile drive via Pacific Grove and Cypress Point,—and a right royal treat it has been to them! For miles the well-traveled road meanders along the sandy, algæ-covered beach and through groves of these arboreal monarchs of past and conquered centuries. Great trees, forty to sixty feet high and four to seven feet in diameter, are seen, with vast depressions near them, where grew their predecessors. Deep, dark, solemn groves are penetrated where, in its best estate, the trees tower upwards grandly with their crowns of verdure. Holding the rocky points against all comers are a thin phalanx of grim warriors, disintegrating the beetling crags with their roots, while their crowns are clipped and molded into fantastic shapes by ocean storms.

The furious blasts of winter, tearing up out of the sea and meeting with the adamantine rocks, are split and separated into keen-cutting currents that plow through the first phalanx and on to the interior forest, hewing or beating down the young sprays of vegetation in their progress, shaping the foliage into platforms, benches, or exhibition shelves, now on one side, then the other, one shelf above the other to the tabular summit—as though a rounded head of solid verdure were cut through at irregular distances, and the greater portions removed.

Interior, and in all sheltered localities, the Monterey Cypress becomes one of the most symmetrical of trees. In San Francisco, and in all the communities up and down the Coast, no tree is more frequently met with under cultivation; utilized principally for windbreaks and hedges, though often for ornament.

This peculiar tree is a marked example of the great age and decrepitude to which a tree may arrive before it gives

up the struggle of life. Here and there an old hero is met with that has but a few sprays of foliage left, and such trees for many years past have consequently been putting on but thin layers of wood. And the new material is applied, not all around the trunk, but on portions connected with the live limbs; and these portions become high-raised, exceedingly crooked—the sap following the high road and leaving the rest of the trunk unfurnished.

The principal limbs behave similarly, the life-current, like a small stream in a wide river-bed, changes from side to side, causing the limbs to present sharp knees and angles, the lower limbs succumbing to fate and forming dry, hard, sharp bayonets, like *chevaux de frise* protecting a sentinel tower.

The cones of the Monterey Cypress—as might be expected from its botanical name, *macrocarpa*—are quite large, the largest of the genus, an inch to an inch and a half long, the young cones with broad foliaceous ears, or tips. The cones are often clustered near the ends of short twigs, dark green ordinarily, but often they become a shining bronze-yellow. Seeds numerous, ten to twenty to the scale, or one hundred to two hundred and fifty to the cone.

As with most plants under cultivation, the Monterey Cypress has already developed several marked varieties.

Variety *angulata*, Lemmon, is distinguished by having the scales numerous, ten to sixteen in an elongated cone, giving the cone a many-sided, hexagonal form, if composed of six pairs of scales, or polyhedral, if containing more scales.

The leaves of all the forms of Monterey Cypress differ from other Western cypresses, in being indistinctly four-ranked, so that the ultimate branchlets are nearly terete, not quadrangular, as in other species.

2. **Gowen's Cypress** (*C. Goveniana*, Gordon).—Shrubs, or small bushy trees six to ten feet high, branches spreading, and the ends pendulous; branchlets more slender than the former, the leaves smaller, thick, and without dorsal depressions; cones smaller, globular, about an inch in diameter, of six to eight scales. Sparsely found in the Coast ranges, from Mendocino to Monterey County, a fine grove on Mount Tamalpais.

3. **Pygmy Cypress** (Variety *parva*, Lemmon).—On the "White Plains," a narrow strip of poor clayey land paralleling the ocean a few miles back of the town of Mendocino, apparently the dust-dune of a former beach, is found sparsely the strangest little trees one sees outside of a Japanese garden. They are often but a few inches high, four to six inches, the cones not larger than buckshot. The little starvelings, growing close together, show but a few leaves—seemingly a mass of little purple beads upheld by shining iron wires!

4. **MacNab's Cypress** (*C. Macnabiana*, Murr.).—Shrubs or small trees, with numerous short, slender branchlets; leaves very small, deep green, or yellowish, conspicuously dotted or pitted on the back, the depression filled with a grain of resin, which becomes white; cones quite small, about one-half inch thick, scales six to eight, with thin prominent bosses, the uppermost flat, leaflike, and incurved; seeds numerous and small.

First reported by Jeffrey, from the vicinity of Mount Shasta, and later by Bolander and Purdy, from near Clear Lake. Found December, 1895, by the writer, forming a scattering grove on a ledge of blue soapstone at Magalia, a few miles east of Oroville, Butte County, California. The cones of this grove are larger,—an inch in diameter,—the large upper scale-vestiges one-quarter inch long, and strongly incurved, the leaves very small and greenish-yellow. (This may be a distinct form.)



GROUP II.—SOUTHERN CYPRESSES.

RECENTLY DISCOVERED SPECIES.

5. **Guadaloupe Cypress** (*C. Guadaloupensis*, Watson).—In 1879, Dr. Palmer found on Guadaloupe Island, in the Pacific, three hundred miles off the shore of the California Peninsula, a large-fruited Cypress, which at first was taken to be a form of Monterey Cypress, but eventually Professor Watson, believing it distinct, named it as above. Since then other groves have been discovered on the mainland opposite, and along northward, to the vicinity of San Diego.

Branchlets slender, drooping; leaves light green; cones quite large. Peculiar for the behavior of the bark, the outer cortex scaling off and leaving the inner of a reddish color.

Seeds were obtained and the plants widely distributed. Beautiful trees with these characters are growing in Piedmont Park, Oakland, and Golden Gate Park, San Francisco.

6. **Arizona Cypress** (*C. Arizonica*, Greene).—The next year after the above discovery (1880), Professor Greene discovered, at Clifton, near the Santa Catalina Mountains, a beautiful Cypress with nearly the same character of the shore Cypress described above. The next year (1881) the writer of these papers discovered a line of four miles of large trees following the crest of one of the highest peaks of the Chiricahua Mountains, about 11,000 feet high, in Southeastern Arizona. The trees were naked from near the bottom to the farthest limbs of the top, the branchlets stout, erect, and with large pointed leaves, forming distinct ranks of fours.

Some dendrologists regard all these forms as varieties of one species, but the maritime habit of the one, with drooping branchlets, etc., seems sufficient to distinguish \*

it from the high-mountain, interior species, with robust, erect branchlets and smaller fruit.

7. **Bonito Cypress** (Var. *bonito*, Lemmon).—In June of the same year (1881), the writer and his wife discovered a grove of cypress occupying a swampy location along the mouth of Bonito Creek, in the Chiricahua Mountains, about twenty miles south of Ft. Bowie. While tallying in several respects with the Arizona Cypress described, the bark of the trunks and limbs is firmly retained. On the trunks it is disposed in longitudinal ridges, divided into sections a few inches in length, by diagonal reticulations, imparting to the trees a curious latticed appearance. Small trees growing in the open, were perfect in their conical outline, with bright foliage and shining cones.

#### AN ALLIED GENUS.—THE JUNIPERS.

This the last tribe of the multitudinous *Cupressaceæ*, or cypress-like trees, also composing the last genus of the entire Order of Cone-bearers, is peculiar in being so compact and nearly uniform a group as to be generally considered as a single genus (*Juniperus*), though comprising a large number of species.

The fruit is a much condensed, almost consolidated body, called a *galbulus*, or drupe, only the vestiges of the ends of the scales being visible. Being nearly round and very small, it is generally called a berry—the well-known juniper-berry.

The Junipers are evergreen, slightly resinous trees, or shrubs, found in temperate and frigid regions of the Northern Hemisphere, on tops of tropical mountains, generally in arid interior localities; their fine branchlets and small scalelike leaves being better adapted to hot, dry climates than would broad-expanding, thin leaves. Of course, like other plants of arid regions, other organs (the

branchlets) perform the functions of leaves in the elaboration of sap; the tender branchlets being endowed with stomata, or breathing-pores, and so dispensing in great part with regular leaves.

The noted *Palo Verde*, or Green Acacia of Arizona and Mexico, is an extreme case,—the trees bearing only little dots of leaves, and these only for a few days in winter.

There are about forty known species, but some have been in cultivation so long that many forms have been developed, so diverse in character than they would be declared distinct, if found in nature. This fact proves the horticulturist's belief that "any species of plant is always ready to change its locality and its habitat for better ones." The convulsions of nature and the vicissitudes of the Ice Age have given to the world the so-called natural characters; while man may at any time remove trees to different soils and climes, and surround them with different influences—and actually create different species! Witness the wonderful deeds of Luther Burbank along this line.

About twenty species of Juniper have been found in the Old World—with Central Siberia and Northern India and China and Central Africa practically unexplored. One of these is found also sparsely in America, five are in Mexico (two of them reaching Texas), two are in the Eastern States, and seven are on the Pacific Slope.

Some authors divide the Junipers into three sub-genera: *Oxycedrus* (the sharp-leaved, true Juniper), with leaves in whorls of threes; *Sabina*, the Savin Junipers, with leaves in pairs, and opposite; and *Cupressoides*, with leaves in pairs, but dimorphous, and the cones cypress-like—i. e. with slightly separating scales.

One of the sub-genera, named foregoing, contains most of the Western species; the two other sub-genera are each represented by one species only.

SUB-GENUS *CUPRESSOIDES*—CYPRESS-LIKE JUNIPERS.

Flowers mostly terminal, leaves in twos, opposite, forming four ranks, scalelike, glandular, and closely appressed in the ultimate branchlets. Berries large, more or less angular, with prominent vestiges of the agglutinated scales.

1. **Alligator Juniper** (*J. pachyphlœa*, Torrey).—This very singular tree of Arizona and New Mexico, and sparsely southward in Old Mexico, has very thick bark—one to three inches thick, which is usually whitish, hard, persistent, deeply furrowed, and cross-checked into squares or oblong blocks. The berries are large, nearly a half-inch thick, dark green, becoming brown, three to four seeded, the fibrous flesh sweetish to the taste; hence a staple article of Indian food. Trees fifty to sixty feet high, with trunks three to five feet in diameter, with long spreading branches. Inhabits high plateaus, 4,000 to 6,000 feet in altitude. At its best on the wooded plateau south of the San Francisco Mountains, and when seen from the railway-train, the rounded head of verdure upheld by a thick, white trunk, checkered like the hide of an alligator, this tree is never suspected of being a Juniper, and is a never-failing object of interest to travelers.

SUB-GENUS *OXYCEDRUS*—PRICKLY JUNIPERS.

Small-berried species, with leaves ternate, jointed at base, half an inch long, half a line wide, convex and sharp-pointed. The common Juniper of Europe belongs here (*J. communis*, Linn.). It has been so long in cultivation that many marked varieties have been produced. One is a tree with bronzy or dark-red foliage, frequently met with in pleasure-grounds; other species are distinguished by having long, prickly ternate leaves and short, smooth binate ones on the same limbs, often on the same branchlet. A prostrate variety is found on the northern mountains of the Pacific Slope.

2. **Creeping Juniper** (Var. *Siberica*, Rydberg).—A prostrate form of the preceding species, is found rarely on our northern mountains next the eternal snow-banks, hence most of the year enveloped in ice. Collected by the writer and his wife near the Elliot Glacier on Mt. Hood, September, 1894. Found as far south as Mt. Stanford, Nevada County, California. The long, creeping branches, rooting freely in the glacier mud, their densely-leaved branchlets gemmed with dark-green, beadlike berries, the strong, sharp leaves white-lined above with scores of stomata, or breathing-pores, the plants are no less surprising than pleasing.

SUB-GENUS *SABINA* — THE SAVIN JUNIPERS.

Trees with flowers terminal on short branchlets; seeds solitary to twelve; leaves binate and forming four rows, or in threes and six-ranked. On young plants and on vigorous shoots, large, free at tip, and very sharp.

This group comprises the rest of the Western Junipers, divided for convenience into two sections:—

SECTION I.—LARGE-FRUITED JUNIPERS.

GLOBULAR OR OBLONG, GREEN, BECOMING BROWN.

3. **California Juniper** (*J. Californica*, Carriere).—Conical-shaped trees often thirty to forty feet high, with irregular trunks one to three feet thick; bark thin, on old trees soft and shreddy; berries large, green, and glaucous, the first season becoming reddish-brown; leaves ternate, obtuse, often conspicuously glandular. A low-sprawling shrub on the San Gabriel plains of Southern California, they extend eastward, become trees, and climb the cross ranges to the Sierra, where they reach Walker's Pass, at an altitude of about 9,000 feet.

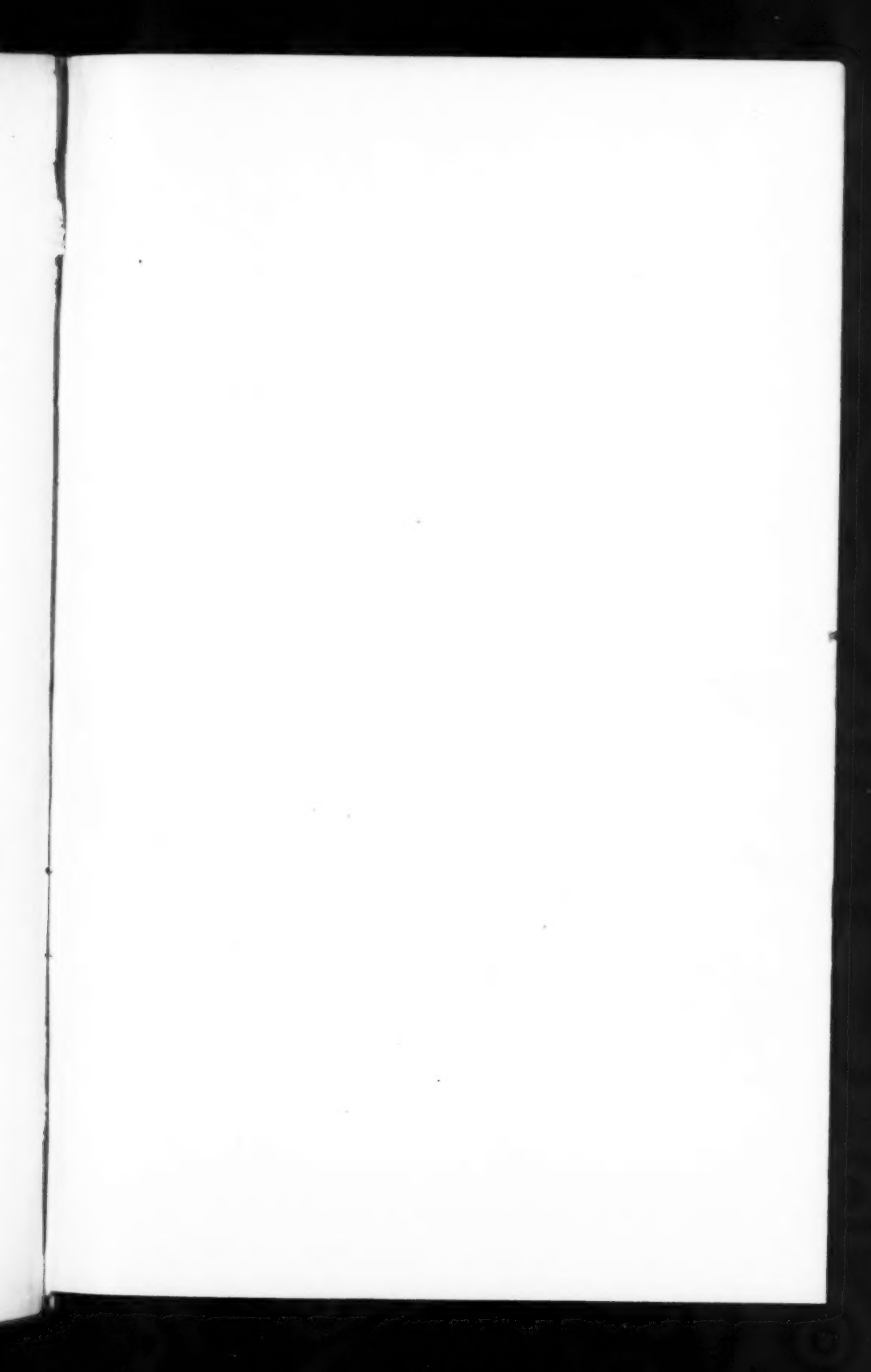
The species is sparsely found in the Coast Range as far north as the lower Sacramento River. Very serviceable as fencing material and fuel.

4. **Basin Juniper** (*J. Utahensis*, Lemmon).—Trees on the eastern slope of the Sierra Nevada, yet within the limits of California are numerous and of large size, fifteen to twenty feet high, with short, usually eccentric trunks, one to two feet thick. In the Great Basin usually smaller, and with divided trunks. Branches erect, contorted, forming an open head, or with several branches springing from near the ground and ascending eight to ten feet; bark thin, ashy-gray, becoming dingy-brown, sometimes whitish, broken into long, soft divisions; branchlets slender; leaves in pairs or threes, oppressed, glandless, turning brown in drying and remaining on the tree; berries quite large, about one-third of an inch in diameter, ripening at the second season, with dry, fibrous, sweetish flesh.

Found mainly in the arid region between the Rocky Mountains and the Sierra Nevada. In Nevada it is the only tree that descends to the general level, where it forms open forests at elevations of about 5,000 feet. On the mountains it mingles with the single-leaved Nut Pine in forming forest covers. Juniper Mountain, a high, rolling plateau extending from Southern Nevada to Southern Utah, is covered with a pure forest of this interesting Juniper. Extends southward to Northern Arizona and New Mexico. Early confounded with *J. Californica*, but very distinct in the characters mentioned and in the very different habitat—the two separated by the Mohave Desert, and never commingling.

One quite marked variety, or perhaps distinct species, has been detected:—

5. **Cosnino Juniper** (Var. *Cosnino*, Lemmon) *N. var.*—Fine round-headed trees, with abundant branches and distinctly terminal flowers; leaves ternate, often free at the ends; berries very large, over half an inch long, often almost bi-lobed; seeds two to four. A distinct forest along and near Cosnino Cañon, ten miles east of Flagstaff,





Western Juniper.  
*Juniperus occidentalis*.

WESTERN JUNIPER.—*Juniperus occidentalis*, Hook.  
From a photograph by J. G. Lemmon.



California Nutmeg.  
*Tumion Californicum*.

CALIFORNIA NUTMEG.—*Tumion Californicum*, Greene.  
From a photograph by J. G. Lemmon.



Arizona, south and near the base of the San Francisco Mountains.

A marked feature is the thick, soft, but strong bark, which separates from the old trees in ropelike pieces several feet in length. Used by the Indians in making their mats and thatching their tepees. Collected by J. G. Lemmon and wife, November 25, 1892.

Probably distinct, and entitled to specific rank as *Juniperus Cosnino*, n. sp.

#### SECTION 2.—SMALL-FRUITED JUNIPERS.

##### GLOBULAR, GLAUCCUS, BECOMING BLUE-BLACK.

6. **Western Juniper** (*J. occidentalis*, Hooker).—Becoming trees forty to sixty feet high, with straight trunk two to four feet in diameter, but more frequently not exceeding twenty feet high, with broad, rounded, low head, and a trunk seven to ten feet thick. Branchlets stout and thick after the leaves fall, covered with red-brown bark, which breaks into loose, papery scales; leaves in threes, closely appressed, ovate, obtuse, and conspicuously glandular; berries globose or oblong, one-fourth to one-third of an inch long, with a thick, blue-black epidermis, and dry flesh filled with large resin-glands—hence unfit for food. Found on mountain slopes of Idaho and Eastern Washington, down along Cascade and Sierra Nevada Mountains to San Bernardino Mountains.

Attains its greatest trunk-diameter on the western slopes of the high, bald, rocky, wind-swept Sierra, where it is often found at 10,000 feet altitude, standing like a sentinel, alone, its massive trunk and far-reaching branches apparently clasping the rocks and crags, it seems impregnable to the fiercest winter gales. In company with the Murray Pine and the Alpine Pine, growing in the rich glacier meadows, it becomes a tall, symmetrical, well-behaved tree, of great age—one or two thousand years.

In Bear Valley, on the northern slope of the San Bernardino Mountains, at an altitude of 6,000 to 7,000 feet, it forms a nearly pure forest of great value.

7. **One-Seeded Juniper** (*J. monosperma*, Sargent).—Trees forty to sixty feet high, with a much-fissured and buttressed body, one to three feet thick, these Junipers are found from the western mountains of Colorado, southward to Texas and westward to Utah, New Mexico, and Arizona. The branches are short and stout, forming an open, irregular head; often an unsightly shrub, with numerous contorted limbs; bark thin, shreddy, in narrow ridges which separate into long persistent scales, disclosing the red inner bark; leaves binate or ternate, and without glands; berries globose, an eighth to a quarter of an inch long, dark blue, becoming copper-colored; flesh sweetish, from which, on some trees, the seeds partially protrude; seeds one to three.

8. **Rock Juniper** (*J. scopulorum*, Sargent).—This tree has long been taken for the Red Juniper of the East (*J. virginiana*, Linnæus), a tree very widely distributed over the northern part of North America. This tree is distinguished for its usually tall, slender growth, often one hundred feet high, its small glaucous fruit, and its soft, easily-worked red wood, which is largely used in making tubs, measures, and general cabinet work—and especially in the manufacture of pencils.

The form in the West, from the Black Hills of Nebraska and the mountains of Montana and Idaho southward to Arizona and New Mexico, has been separated by Professor Sargent, and named as above. It differs from all other Western Junipers in having white sap-wood and bright-red heart-wood, with bark deeply furrowed longitudinally; the branchlets very slender, long, and drooping, much like a Lawson Cypress.

It is fond of the banks of dry cañons, clinging to crev-

ices half-way down to the water, and holding out its waving arms, swaying with every breeze, as in very approval of the raging storm.

It should be stated in this connection that, as an afterthought, Professor Sargent receded from his position, and in his North American Sylva has referred this form to the beautiful and widely distributed Virginia Juniper, with this statement: "This, the largest and most valuable of American Junipers, is the most widely distributed coniferous tree of North America."

9. **Wyoming Juniper** (*J. Knightii*, Avon Nelson).—"Small trees or large shrubs, usually branched from the base, with a rounded bushy clump of sub-equal spreading branches ten to thirty feet high; branchlets stout and thick; leaves in threes; berries large, blue-green or copper-colored; scale-vestiges prominent; seed single, rarely two, pulp dry. Usually the sole occupants of the dry Red Desert and other regions of south-central and south-western Wyoming." Perhaps not distinct, having many of the characters of *J. monosperma*, described, except in the character of "berries large," which must be an error, if the seeds are single. (Description quoted from Nelson's brochure.)

#### ORDER TAXACEÆ.—THE YEW FAMILY.

This large order of trees is sometimes discussed with the Cone-bearers, because they are slightly resinous, but it is best to consider them as separated. They are really very numerous, but as its members are principally in the Old World and the Southern Hemisphere, the group does not seem of importance to us.

The order comprises four tribes, with twelve genera and about ninety species. Among them are the great trees of *Podocarpus* (foot-stalked fruit), a genus of Australia, comprising fifty species; the *Dacrydiums*, of nine species,

in India; and the curious Prince Albert Yew (*Saxe Gothæ*), of Patagonia; besides the true Yews, of five genera—two of which alone represent the entire order in America. The whole order is diœcious—i. e. the male, or pollen-bearing, flowers on one tree, the fruit-bearing on another.

**True Yews** (*Taxus*, Tournefort).—The true Yews are numerous as regards species in foreign regions, with two species in the Eastern States, and one on the Pacific Slope. The principal European Yew is *Taxus baccata*, of Linnaeus, found in most parts of Europe at elevations of 1,000 to 2,000 feet, from the mountains of Greece and Italy to Spain and England northward to the Scandinavian mountains. Usually a large bush, it often becomes a small tree, with a short stem and ample head composed of many branches set with drooping branchlets clothed with dark-green, linear leaves in two ranks.

Several varieties have been produced in cultivation, principal of which is the Irish Yew, considered distinct by Sir William Hooker, and named by him *Taxus Hibernica*. It is a tree with strict, erect branchlets, closely compressed, like an Italian Cypress, the leaves scattered; the berries are oblong, not globose, as in the common Yew.

The principal Yew of the Eastern States (*Taxus Canadensis*, Willd.) is distributed as a straggling bush throughout the provinces of Canada and in New England. Another in the Southern States becomes a small tree in Florida.

**Pacific Yew** (*Taxus brevifolia*, Nuttall).—This Yew is a special product of the peculiar Western forest development. It becomes a large tree in favoring circumstances, two to four feet in diameter, and seventy-five to one hundred feet high. It loves the borders of streams in low, rich woods of Western Washington and Oregon, extending northward to British Columbia, and southward along

the Coast Range to Santa Cruz, while eastward it penetrates as a small shrub the forests of Idaho and Montana, and down on the Cascade and Sierra ranges to Yosemite Valley. In the Coast Range it becomes a tree two to four feet in diameter, with wide-spreading branches.

The wood of the Yew is strong, elastic, anciently in use for making Indian bows. The fruit is composed of a small, fleshy, bright-red edible cup three to five lines in diameter, holding a solitary ovate, hard-shelled seed, sitting like an acorn, except that it is free in the bottom of the cup. Prized by the natives for food.

**False Nutmeg-Tree** (*Tumion*, Rafinesque).—This genus comprises four species, the first discovered in Florida, a second in China, a third in Japan, and the fourth is in California. They are usually small trees of a heavy odor. They have a one-seeded drupaceous fruit that both exteriorly and interiorly resembles the nutmeg of commerce, but unlike it in other respects, being strongly impregnated with a terebinthinous fluid.

The first species, marking a singular deviation from known members of the order, and rightly judged to the type of a distinct genus, was named *Torreya*, in honor of the distinguished pioneer of American botany, Dr. John Torrey; but later researches discover that Rafinesque had in some way previously received specimens and had named it as above. Botanists still fondly call it Torrey's Nutmeg.

**California False Nutmeg** (*T. Californicum*, Greene).—This most singular tree is quite local in two limited regions quite different in altitude and environment (suggesting a division of the species),—one a narrow strip along the coast from Mendocino to Santa Cruz comprising large trees two to five feet in diameter, the other a thin line of trees on the west slope of the Sierra Nevada from

Butte County to Mariposa County (Yosemite Valley). The wood is strong-scented, light, soft, unadapted to use in the mechanical arts.

The branches are regular, mostly in layers, resembling the Fir family. The leaves, dark-green and shining, are very large for the genus, lanceolate, one to one and one-half inches long, and tapering to a sharp point. They are distinctly lined below with two longitudinal furrows, and disposed in two ranks along the stout branchlets. The "nutmeg" is borne pendently on the ends of the branchlets, like a small plum, oblong, three-fourths to one inch long and half as thick, often found a third larger. In the Santa Cruz Mountains near Stanford University are several noted trees of large size and great beauty. Trees near Mendocino are found three to five feet in diameter. Several in Marin County near San Francisco are nearly as large; one small but very beautiful tree, on the line of railway near Camp Taylor, has been provided with an appropriate label for the information of travelers.

**Coast Nutmeg** (Variety *littoralis*, Lemmon).—The original description of the California Nutmeg having been drawn from specimens of the small form on the high, dry flank of the Sierra, the writer, in his Handbook of West-American Cone-Bearers (1895), published the beautiful, more robust, often gigantic trees of the low, fog-drenched coast, with fruit as large as an egg-plum, under the above name; and the differences in characters seem to justify the separation.

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In concluding these papers on the Cone-bearers (to be followed, perhaps, by others on the Broad-leaved Trees), I should make an explanation of an omission in one of the early descriptions.

In the BULLETIN of May, 1897, discussing the Pine family (at the bottom of page 73), the range of the Big-

cone Pine (*Pinus Coulteri*, Don) was given as—"Southern coast mountains from San Luis Obispo east to San Bernardino, and southward to highest peaks of San Diego County."

From early times it has been reported that trees of the Coulter Pine were found on Mt. Diablo. Some writers reported that the trees belonged to the other large-coned species, the Gray Pine (*P. Sabiniana*, Dougl.), and so, there being a diversity of opinion, I left out this northern locality for the Big-cone Pine until the question was settled.

The confusion has arisen from the fact that groves of both species are found on the slopes of that celebrated mountain. One in Pine Cañon, on the west slope of the mountain, is a marked form of the Gray Pine, with its light-green, sparse leaves and large ovoid cones; while in Mitchell Cañon, on the northern slope of the mountain, and spreading over the broad ascending slope toward the east of it (in full view of the village of Clayton), is a fine large grove of about one thousand acres of Pines, with long elliptical cones and dark-green leaves, that, on account of these principal characters, must be classed with the Big-cone (or Coulter) Pine.

As long ago as 1878, the writer, exploring Mt. Diablo, found the two pines, and sent specimens of each, with descriptions of the trees, to Professor Bolander, then the authority on trees of the Pacific Slope. He reported, "Both are marked specimens of the variable Digger Pine (*P. Sabiniana*)."

Visiting the region twice later, and giving especial attention to this northern grove, I am convinced more than ever that the trees are an aberrant form of the Big-cone (or Coulter) Pine (*P. Coulteri*, Don). They are comparatively smaller trees than the typical species in its far-away southern home, with smaller cones and

shorter leaves, but in general characters unmistakably the same.

The trees are fifty to eighty feet high, spire-shaped, with an abundance of dark-green leaves in fascicles of three, and about one foot long. The cones, narrowly elliptical, rarely a foot long, are strongly declined, and firmly persistent for six to eight years. They are slightly incurved and armed with large formidable hooks, terminating the scales, each about an inch long and nearly of the same length on all sides of the cone. They are shaped like and about as large as hawk-bills. The black seeds are much larger than in the type—being five-eighths to three-fourths of an inch long, the wing shorter,—i. e. one inch long beyond the seed,—one-half inch wide and one-eighth inch thick at the base.

This beautiful outlying form of the noble Coulter Pine, with its smaller proportions, its strongly protected, hook-defended cones, etc., is possessed, it would seem, of enough divergent characters to entitle it to a varietal name, and may be designated as Variety *Diabloensis*, N. var.—The Mount Diablo Hook-cone Pine.



ORDER  
TAXACEÆ.

THE TAXADS.

Yews and their  
Allies.

Leaves linear,  
short. Fruit,  
Drupe-like, sin-  
gle-seeded.

Abundant in  
the Old World.  
Represented in  
America by only  
two genera, one  
species of each  
on the Pacific  
Slope. Both in  
California.

ORDER CONIFERÆ—CONCLUDED.

Division II.

CYCLALES, THE WHORL-CONK TREES.

Fragrant trees with small scale-like leaves,  
these and also their cone-scales in twos (then  
opposite), or in threes (ternate). Slow-growing,  
fine-grained trees of both hemispheres.

Tribe 2.

One large compact  
genus, composing the  
Junipers.

Fruit a consolidated  
"berry," with ves-  
tiges of scales.

Junipers.

Tribe 1.

Cypresses and their  
Allies—Two Pairs.

1st Pair.  
American Cedars.  
Fruit oblong and  
fibrous.

2d Pair.  
The Cypresses.  
Fruit globose and  
woody.

GROUPS.

GENERA AND  
SUB-GENERA.

BOTANICAL  
SPECIES.

ENGLISH NAMES.

*Libocedrus*.

Incense Cedar.

*Thuja*.

Arboresc.

*Chamaecyparis*.

Ground Cypress.

*Calocedrus*.

Southern Cypresses.

*Juniperus*.

California Cypresses.

*Juniperus*.

True Cypresses

*Juniperus*.

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1. *Decurrens*.

Incense, (or Post) Cedar.

1. *Plicata*.

Canoe, or Red Cedar.

1. *Sitchuanica*.

Alaska, (or Yellow) Cypress.

2. *Lausitanica*.

Lawson Cypress.

1. *Guadalupensis*.

Guadaloupe Cypress.

2. *Arizonica*.

Arizona Cypress.

var. *bonita*.

Bonita Cypress.

3. *Macrocarpa*.

Monterey Cypress.

4. *Goveana*.

Goven's Cypress.

var. *parva*.

Pygmy Cypress.

5. *Macnabiana*.

McNab's Cypress.

1. *Pachyphloea*.

Alligator Juniper.

2. *Occidentalis*.

Western Juniper.

3. *Californica*.

California Juniper.

4. *Utahensis*.

Great Basin Juniper.

var. *canina*.

Coastal Juniper.

5. *Monosperma*.

One-seeded Juniper.

6. *Scopulorum*.

Rock Juniper.

7. *Knightsii*.

Knight's Juniper.

8. *Communita*.

Common Juniper.

var. *Siberica*.

Creeping Juniper.

1. *Brevifolia*.

Pacific Yew.

1. *Californicum*.

California Nutmeg.

JUNIPERUS. 5

True Junipers

*Cedrus*.

Cypress-like Junipers.

*Sabina*.

Savin Junipers.

*Oxycedrus*.

Prickly Junipers.

*Taxus*.

True Yews.

*Juniperus*.

False Nutmeg.

CUPRESSUS.

True Cypresses

## BIRDS OF THE HIGH MOUNTAINS.

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BY VERNON L. KELLOGG.

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The end of the day's steady tramping came not too soon to be unwelcome. In the beaver swamp at the cañon's mouth we had splashed for an hour; we had not scaled the rough rock-wall of a promontory which nearly closed the gorge without scratches and bruises; we had found most precarious footing over a great mass of loose, sharp rock-debris, sometime hurled in one crashing avalanche from the towering cliff-side; and the long, weary stretch of fallen pines beset with dense undergrowth had left grave doubts in our minds about the reality of the delights of mountaineering. And yet there were delights. Here in camp in the depths of the gorge, with the reaching walls inclosing and protecting us; in the soft dusk creeping up the cañon about us, while far above the glancing day still hovered; in the white banks of snow on the distant peaks, still shot across and made glorious by the sun's rays; and in the steady rhythmic plashing of the restless stream over the rounded rocks of its bed; in all these were delights. The bit of dancing flame with its tenuous line of smoke wavering up to the spruces' tops and escaping into the chill dusk above; the energetic little coffee-pot, bubbling over with sheer delight; the redolence of the sputtering bits of bacon vying with the piny fragrances in scenting the air about us; the stolid munching donkeys, lazily cropping the scant vegetation;—these incidents of a mountain camp were all delights.

There were pleasant, fresh memories of the day, too. We had decided to give this trip especially to making acquaintance with the mountain birds, and the day, as well as the days before, had been crowded with the incidents of bird-seeing. We had climbed no peaks yet, but had come slowly but steadily up from the plains, and had made acquaintanceship with the birds of the lower levels, —the lower life zones, as naturalists would say,—and were now at our last camp below timber-line, at nine thousand feet.

It is probably familiar knowledge to Sierra-Club men that the naturalist recognizes in climbing mountains practically the same phenomena of animal and plant occurrence and distribution as he does in clambering over parallels of latitude when going north or south from the tropics. Altitude equals latitude in its influence on organisms. Around the base of a great mountain in the tropics there is a lush jungle of tropical vegetation peopled by equatorial animals, a tropical life zone; above the base there is a broad circle, or zone, of sub-tropical plant and animal life; above this a temperate life zone, with its familiar genera of deciduous trees and animals of our own habitat; higher up yet comes the zone of pine-trees, running above into spruces, and fading out at timber-line in the low storm-beaten spruce and juniper "bushes," and peopled by birds and mammals unfamiliar for the most part to us, but like those of the sub-arctic latitudes of our continent. Finally, above timber-line is the true alpine zone, which, with its persistent snow-fields, its low night temperatures, and fearful blizzards, is a true arctic region. Here only low, hardy plants can cling to the rocks, or grow swiftly by the snow-bank's edge in the short, bright summer, and only a few animals, specially adapted to the severe climate, can endure. To be sure, the fauna of a mountain-top is not exactly the same as

the fauna of the arctic zone; the polar bear and musk-ox and reindeer are not found on the peak-summit, because barriers shut them off; but what few animals do live on the mountain-top are characteristically arctic in their habit and affinities, and in not a few instances we have striking examples of the actual identity of alpine and arctic animals. For example, certain butterflies have a range of distribution which is sub-arctic as regards latitude (extending clear across the continent north of the Canadian-United States boundary) and sub-alpine as regards altitude (extending far south along the summit and upper flanks of the Rocky Mountain and Sierra Nevada ranges).

Characteristic and unmistakably recognizable among the birds to be seen on a mountain trip, whether to the Sierras in California or the Rockies in Colorado, is the magpie (Fig. 1), and we found these curious long-tailed birds at the very beginning of our climb. They inhabit the lower flanks of the mountain. The magpie is so large and strikingly colored with its iridescent, bronzed-black back and white shoulders, breast, and under parts, and has such an unusual and conspicuous long tail (a foot or less) that the first glimpse of the birds makes us sure of their identity. Walter Fisher tells of the habits of the magpies about Mono Lake as follows: "Every morning saw small droves of black-billed magpies [naturalists recognize two species, one black-billed, the other yellow-billed] catching grasshoppers, and their keenest rivals at this relentless warfare were the sparrow-hawks. Usually the magpies held forth on the lower slopes of the piñon hill, where they engaged in endless squabbles from daylight till dark, the echoes of their profanity reaching me at the ranch-house where I must need spend much good time in preparing specimens. So well did these two species do their work that by the end of the week nearly



FIG. 1. MAGPIES.

Drawn by Walter K. Fisher; permission of *The Condor*.



FIG. 2. ARCTIC THREE-TOED WOODPECKER.

*Picoides arcticus*.

Drawn by L. A. Fuertes; by permission C. Hart Merriam, United States Department of Agriculture.

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all the grasshoppers had disappeared from the meadows. It proved a very entertaining sight when the magpies chased the grasshoppers, as they occasionally would do, for their agility in dodging and circling proved how mistaken we are likely to be in forming an estimate of a bird under ordinary conditions. Usually nonchalant and absurdly dignified in their demeanor, these birds could at times assume the utmost interest in their occupation, and dart with surprising speed here and there. They used their tails about as much as their wings in flying."

Almost sure to be noted on mountain trips are birds of another extreme in size—the tiny, swift-winged humming-birds. To an Eastern bird-lover, forcedly content with a single, albeit choice, humming-bird species, the ruby-throat, the first experience of bird-seeing in the West will undoubtedly be always memorable by his "discovery" of hosts of humming-birds. The broad-tailed hummer is so abundant in the Rocky Mountains (of Northern Colorado at least, where I learned to know them) that acquaintanceship with it fairly prepares one for the comparative wealth of humming-bird life which is to be found when the Pacific Coast is reached. I do not know how many species of hummers are recorded from the Sierras (four have been found in the Tahoe region), but there are enough to provide delight to every observant mountaineer. Perhaps there are a few bird-lovers who still fondly hold to the unenlightened fancy that the humming-bird's long bill is for nectar-drinking. Be informed! Master Hummer is a blood-letting carnivore! That bill is a dagger, and a dagger with a sharper, fiercer javelin concealed inside of it. The humming-bird tongue is as exquisitely fit a fork for spearing little bugs that are sipping nectar at the bottom of deep flower-cups as nature or the wit of man can well devise.

Another beautiful strong-winged mountain bird is the

violet-green swallow, which we had seen circling about in the cañon a few miles below camp. This species is the common swallow of both the Rockies and Sierras. Other swallows, as the cliff and barn, come into the lower mountains, but they really belong in the valleys. The violet-green is the rightful mountain swallow, and, with its short, slightly emarginate tail, its pure white under parts and velvet-green back, it can be readily distinguished from the barn-swallow, with its long forked tail, or the blue-backed, rusty-bellied cliff-swallow. Violet-green may be seen skimming gracefully over mountain lakes, or wheeling and darting in cañons, anywhere in the mountains up to eight thousand feet altitude.

We had seen grouse, but had n't killed them. And this is not to the discredit of our marksmanship, but to the credit of our good hearts. For the mother grouse we startled was so obviously the mother of grouse that we held our murderous fire and refused to allow the fluttering, feigning bird to sacrifice herself, as she offered, for her young. John Muir has found the mother grouse in the Yosemite. "On the approach of danger," he writes, "the mother with a peculiar cry warns the helpless midgets to scatter and hide beneath leaves and twigs, and even in plain open places it is almost impossible to discover them. In the mean time the mother feigns lameness, throws herself at your feet, kicks and gasps and flutters to draw your attention from the chicks. The young are generally able to fly about the middle of July; but even after they can fly well they are usually advised to run and hide and lie still, no matter how closely approached, while the mother goes on with her loving, lying acting, apparently as desperately concerned for their safety as when they were featherless infants. Sometimes, however, after carefully studying the circumstances, she tells them to take wing; and up and away in a blurry birr and whir



they scatter to all points of the compass, as if blown up with gunpowder, dropping cunningly out of sight three or four hundred yards off, and keeping quiet until called, after the danger is supposed to be past. If you walk on a little way without manifesting any inclination to hunt them, you may sit down at the foot of a tree near enough to see and hear the happy reunion. One touch of nature makes the whole world kin; and it is truly wonderful how love-telling the small voices of these birds are, and how far they reach through the woods into one another's hearts and into ours. The tones are so perfectly human and so full of anxious affection, few mountaineers can fail to be touched by them."

This grouse of the Sierra Nevada is of the same species as the common mountain grouse of the Colorado Rockies. It is variously called by mountaineers blue, or dusky, or pine, or mountain grouse. They are next to the sage-cock in size of all the grouse, reaching a length of two feet. The upper parts of the old cocks are strongly slaty, or bluish-gray, while the under parts are paler, tending to white. Its nearest relative—a distinct and somewhat smaller species, however—is the Canada (or spruce) grouse of the Northwest. The dusky grouse lives mostly on the ground in forest regions, taking readily to the trees when flushed. Here it slowly moves about so as to keep behind the trunk or a large branch, or sits immovable, trusting to its protective coloration to save it from its enemies. On that account it is readily killed if seen, and because of its stolidity is sometimes called "fool-hen" by hunters. Its stolidity is anything but foolish when pursued by natural enemies. But natural selection hardly counted on the man behind the gun!

In the late afternoon, when the way began to seem unusually rough, and even the stream's rushing singing began to pall a bit, we made our best find. Audaciously

standing ankle-deep on the very edge of a little fall in the stream, a sober-mantled, plump-bodied, bright-eyed bird watched us keenly for a few moments, and then with a spray-flirting whisking of short rounded wings dashed up stream. We knew our find with the first glance. We had been told too often and had read too carefully about Mistress Ouzel's seeming and manners to be puzzled for a moment by this quickly vanishing bird-sprite. Indeed, ouzel was an old friend of mine, at least; for a half-dozen summers in the Rockies had brought us to a familiar footing. All through the mountains of western North America from Alaska to Mexico this most interesting and attractive bird is at home. Not a "water bird," as we use the term, meaning the ducks and shore-birds and all the host of related aquatic and semi-aquatic bird forms, but a thrush, a bird of the woodland songster group, that has simply left all the tradition of its ancestors and all the custom of its companions aside and has adopted the swift, cascading mountain stream for home, and the song of the stream for lullaby for its young in the rift of the stream's rock wall. There is no mistaking the ouzel; no other bird swims under water in the stream pools; no other bird stands half submerged but jauntily secure on a rocky stone in the brawl of a cascade; no other bird sings from the depths of a cloud of spray at the side of a fall. He is simply dressed in brown, and looks much like an over-big wren. He bobs and teeters, picks his way daintily over the wet stones, and is ever bold and sure. His song is not loud, but wonderfully sweet and simple.

No bird-lover who has visited the mountains fails to find the ouzel, and if the bird-lover writes, the ouzel is sure to have the major share of the "piece." Olive Thorne Miller is a special lover of the ouzel, and has observed it in Colorado long and patiently and to excellent purpose. Muir has not failed to find the ouzel in the

Yosemite, and has tried to tell of him, but comes to an eloquent stop.

In camp here in the dusk the bird-seeing for the day is over. If we were in the Rocky Mountains, however, it would not be. For we should have bird visitors,—the ghostly leering Canada jays, silently slipping from branch to branch, intently watching us. These silent white-and-gray and ashy-leadened birds of the high mountains, known variously as Canada jays (or, better, Rocky Mountain jays, as the southern bird is a variety of the northern form, the typical *Canadensis*), or "camp-birds," or "moose-birds," or, quite absurdly, "whisky-jacks," are familiar acquaintances of the Colorado mountaineer. I never roamed a day in the great spruce forest on the flanks of Long's Peak or spent a night in those still haunts of the hermit-thrush but the gray jays visited me. Far to the north on the great barrens of New Brunswick, or in the dense forests of the Northwest Territories the Canada jay is well known to caribou- and moose-hunters. The "ubiquitous rascal"—so one naturalist-hunter calls him—hovers about the camps of the hunter and disputes each crumb of bread with him. In the Colorado mountains he is no less tame, and fluttering silently down and up between ground and branch, he makes sure work of any overlooked morsels of food. Mute birds! Not a cry or call, not a clash or rustle of wings to give them reality. They would be impudent were they not so evidently exercising a proprietary right; one would talk with them were they not so plainly mere ghosts.

All through the night there is singing; and there are odors. One lies drowsing and listening and breathing fragrant, soothing balms. The spruces and pines and some mintlike, square-stemmed plant, and the smooth

grass-leaves, and the nodding wind-flowers, the fresh, damp ground, and the fallen dead trunks, all breathe sweet smells. And a subtle, musty, elusive odor—is it the breath of the gray granite walls? And through the odor-weighted air the soft singing of the wakeful stream, telling of its snow-fountains on the dark summits of the range, of its creeping among the alpine buttercups which cling to the very verges of the great snow-fields, of its fearful leap over some sheer cliff to its uneven way down the cañon. A faint singing is high above on the side of the cañon; or is it the singing of the east wind among the aspen's leaves? It is a familiar singing, but whether of bird or leaf or wind one cannot say.

"Bubble, bubble flows the stream,  
Like an old tune through a dream."

The early gray of the mountain morning was welcomed by earlier risers than we. The brisk rapping of a red-shafted flicker at the very top of a stark, branchless spruce shaft reminds one of similar tattoos heard about our valley homes. In truth, this is the same flicker that we have in the lowlands. In the Eastern States a similar species, but with the under sides of wings and tail golden yellow instead of orange red, is the common flicker, or yellow-hammer. But yellow-shafted and red-shafted are so closely allied, and hybridize so readily, that in coming from the East to the Rockies one can collect a series of specimens showing almost a perfect transition from one form to the other. West of the Rockies the red-shafted practically supplants the yellow, and thus is the one flicker of both lowlands and mountain.

The finest and largest of the mountain woodpeckers is the magnificent log-cock. It is from fifteen to twenty inches in length, dull black all over, except for a white throat, a white line on each side of the head and neck, and

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FIG. 3. AUDUBON WARBLER.  
*Dendroica Auduboni*.

Drawn by L. A. Fuertes; by permission C. Hart Merriam, United States Department of Agriculture.



FIG. 4. WESTERN EVENING GROSBEEK.  
*Coccothraustes vespertinus montanus*.

Drawn by L. A. Fuertes; by permission C. Hart Merriam, United States Department of Agriculture.

a splendid scarlet head-crest. The log-cock is a "wild, wary, and solitary" bird, keeping to the heavy forests, and retreating before the advance of man. Other woodpeckers distinctly mountain-inhabiting are the odd alpine three-toed forms, of the genus *Picoides*. (Fig. 2.) These woodpeckers have the first toe absent, the fourth toe being turned backward, as usual in the family. The sides of the head are striped, and the rest of the body, except the white under-parts, barred with black and white, while the males have a square yellow patch on the crown. There are three American kinds of three-toed woodpeckers, all confined to boreal or alpine habitats, and evidently all, together with the Asiatic and European species, descended from a common circumpolar stock. These birds are not so common that the finding of one should not be looked on as a real ornithological coup. W. W. Price has found them on Pyramid Peak. In several summers' tramping in the Rocky Mountains I have seen but five of the birds, and these were all near timber-line.

The singing stream, in this cool dawn, is receiving the morning visits of its friends, the birds of the cañon. Here a brilliant black and scarlet Louisiana tanager, the most strikingly colored of all the Rocky Mountain and Sierran birds, and there the delightful little olive-backed, ruby-crowned kinglet, with its one bit of dashing scarlet concealed by overlying greenish feathers. Ruby-crown's song has few rivals in the mountain forests. Another wee bird commonly to be seen here is the famous Audubon warbler. (Fig. 3.) The male in summer, all bluish above with blackish streaking, and with crown, rump, throat, and breast-sides clear yellow, is a bird of rare beauty. Two other strongly marked birds of this zone are the evening and pine grosbeaks. The beak of these birds is very large and vaulted, being nearly as wide and high at base as it is long. The evening grosbeak (Fig. 4) is dark olive-

yellow, with black tail and black wings with conspicuous white patch; the pine grosbeak is roseate or light carmine, with blackish wings and tail.

As we straggle on through the upper forest belt, intent on reaching timber-line before the sun shall have softened the surface of the broad snow-field which we must cross just above it, we do not keep that silent and sharp watch for the birds which one must if he shall see close at hand the shy, warier denizens of the higher forest. But as careless of the tree-tops and as intent on our footing as we may be, one characteristic bird kind of the upper mountain flanks is almost certain to call itself to our attention. The Clark nutcracker, or crow, (Figs. 5, 6,) is the "ubiquitous rascal" of the High Sierra, as the Canada jay is of the high Rockies, and, as Muir has well said, is the strangest, noisiest, and most notable of all the High Sierran birds. "He is a foot long," writes Muir, "and nearly two feet in extent of wing, ashy gray in general color, with black wings, white tail, and a strong, sharp bill, with which he digs into the pine cones for the seeds on which he mainly subsists. He is quick, boisterous, jerky, and irregular in his movements and speech, and makes a tremendously loud and showy advertisement of himself—swooping and diving in deep curves across gorges and valleys from ridge to ridge, alighting on dead spars, looking warily about him, and leaving his dry springy perches trembling from the vigor of his kick as he launches himself for a new flight, screaming from time to time loud enough to be heard more than a mile in still weather. He dwells far back on the high storm-beaten margin of the forest, where the mountain pine, juniper, and hemlock grow wide apart on glacier pavements and domes and rough crumbling ridges, and the dwarf pine makes a low, crinkled growth along the flanks of the summit peaks. In so open a region, of course, he is well seen. Everybody





FIG. 5.—CLARK CROW.—*Nucifraga columbiana*.

Drawn by L. A. Fuertes.

(By permission of C. Hart Merriam, United States Department of Agriculture.)



FIG. 7.—WHITE-CROWNED SPARROW.  
*Zonotrichia leucophrys*.

Drawn by L. A. Fuertes.

(By permission of C. Hart Merriam, United States Department of Agriculture.)

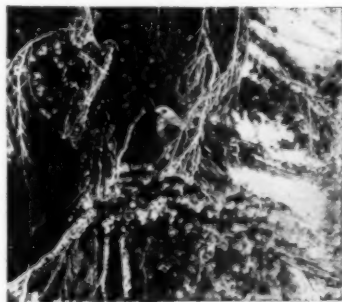


FIG. 6.—CLARK CROW.  
*Nucifraga columbiana*.

Photographed by Walter K. Fisher.

(By permission of C. Hart Merriam, United States Department of Agriculture.)

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notices him, and nobody knows at first what to make of him. One guesses he must be a woodpecker; another a crow or some sort of jay, another a magpie. He seems to be a pretty thoroughly mixed and fermented compound of all these birds, has all their strength, cunning, shyness, thievishness, and wary, suspicious curiosity combined and condensed. He flies like a woodpecker, hammers dead limbs for insects, digs big holes in pine-cones to get at the seeds, cracks nuts held between his toes, cries like a crow or Stellar jay,—but in a far louder, harsher, and more forbidding tone of voice,—and besides his crows and screams, has a great variety of small chatter talk, mostly uttered in a fault-finding tone."

In the Lake Tahoe region, W. W. Price found Clark crows common everywhere about eight thousand feet, and on Mt. Tallac they continually pilfered his traps. Muir found them feeding their young as early as June 19th at a height of more than ten thousand feet, when nearly the whole landscape was snow covered.

As we push our way through the low, wind-beaten spruce bushes of timber-line a nervous, fluttering, finch-like bird is fairly numerous. This is the white-crowned sparrow (Fig. 7), one of the hardiest and most widely spread of all the sparrows and a familiar acquaintance of every mountain-climber in both Rockies and Sierras. White-crown nests above seven thousand feet, often undoubtedly just at timber-line, and its friendly, simple, half-sad little melody comes most welcomingly to one just stirring out in the cold dawn of a timber-line camp. In the Rockies I have seen white-crown well up on the peak sides above timber-line in the middle of the day. The conspicuous black-and-white-striped poll and the unmistakable "sparrow" appearance of the whole body make it easy to know white-crown when you meet him.

Above timber-line, on the steep, bleak, wind-swept

slopes of the Rocky Mountain crests, among the bare brown rocks and scattered snow-patches the mountain ptarmigan lives its lonely life. Exposed to the violent storms which sweep over the mountain summits, prey of the golden eagles and falcons which range the high peaks, the brown-and-white hen fights out for itself and young the wages of existence. With curious adaptive mimicry, the ptarmigan, in winter, when the high mountain slopes are wrapped in snow, puts on a plumage of unspotted white; but when the suns of spring sweep the brown rocks of their snow coat, leaving only the deep and protected never-melting snow-fields scattered over the summits, the ptarmigan dons a brown-and-white habit that harmonizes with the changed appearance of its mountain fields. One can rarely make an ascent above timber-line in the Rockies without seeing ptarmigan,—the upper slopes of the Front Range are thickly inhabited by them,—but the bird is yet to be seen in the Sierras. Grinnell thinks that it does not occur in the State. It is found in the Cascades of Washington and Oregon as far north as Mts. Hood and Jefferson. It seems strange that it does not come farther south.

We have come now to the very summit of the crest, to the capstone of the peak. Apparently we have passed the homes and feeding-grounds of even the bravest mountain birds. To be sure, the great golden eagle may soar royally aloft among the peaks, but its aerie is below us. We have brought ourselves on slow and patient feet beyond the range of the birds. But hold!—from the jagged cliffs of the peak's east side comes a gentle twittering, and then before our astonished eyes flutters a dainty, well-fed little bird, the gray-crowned leucosticte, or rosy finch. A chocolate-brown body, with crimson tinge, and brown to dull black crown has leucosticte, which belongs to the great family of finches, or seed-eaters, and is rather like

our common linnets. Its home is on the mountain's top, the crest's last ridge. Fluttering over snow-banks, where it reaps a rich harvest of frozen insects, or sweeping swiftly along in the strong wind, or darting into crevasses and rock-crevices for shelter, our brave little bird is a contented dweller in this truly alpine home. Far to the north on the Alaskan coast and Bering Island its cousins live at sea-level. But in this latitude *leucosticte* finds an arctic habitat at fourteen thousand feet altitude. On the very summit of Long's Peak (14,271 feet) in Colorado I have shared my luncheon with this hardy little mountaineer. . . . As we stand on the capstone of our mountain and look far out over the foothills and into the valley where wind peacefully the waters escaped from their mountain fastnesses, *leucosticte* flits over the cliff's edge and drops fluttering to the little green lake a thousand feet below. If we could drop as lightly we should be sooner home than we shall be.

## SIERRA CLUB BULLETIN.

PUBLISHED IN JANUARY AND MAY OF EACH YEAR.

Published for Members.

Annual Dues, \$3.00.

*The purposes of the Club are:—"To explore, enjoy, and render accessible the mountain regions of the Pacific Coast; to publish authentic information concerning them; to enlist the support and co-operation of the people and the Government in preserving the forests and other natural features of the Sierra Nevada Mountains."*

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Mr. A. G. ELLS,	Mr. E. T. PARSONS,
Mr. J. S. BUNNELL,	Mr. R. H. F. VARIEL,
Prof. J. H. SENGGER,	Mr. TRACY R. KELLEY.

#### *Committee on Admissions,*

Directors DUDLEY, OLNEY, and McALLISTER.

#### *Committee on Parks and Reservations,*

Prof. GEORGE DAVIDSON, *Chairman.*

Prof. W. R. DUDLEY,	Pres. DAVID STARR JORDAN,
Mr. J. M. ELLIOTT,	Mr. ABBOT KINNEY.

#### *Committee on Outing and Transportation,*

Mr. Wm. E. COLBY, *Chairman.*

Mr. J. N. LeCONTE,	Mr. EDWARD T. PARSONS.
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## SECRETARY'S REPORT.

FROM MAY 2, 1901, TO MAY 10, 1902.

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The Club's membership is rapidly increasing. Attracted by the outing feature, over a hundred and twenty new members have been added to the list since the 1st of January, and last year there were more than fifty such who joined the Club. In a few weeks the total number of new members for a little over a year last past will be in the neighborhood of two hundred, or more than a third of the entire membership, which is rapidly approaching the six-hundred mark. As stated in last year's report, these newly-acquired members are most desirable, since they have the true mountaineering spirit, and their acquisition will add largely to the life, spirit, and growth of the Club.

This outing feature is already abundantly proven to be a most desirable element in the Club's existence, and it is hoped that it will be so extended in the future that special rates may be secured for members to all points of interest in the mountains.

Outings to Alaska, Mt. Rainier, the Yellowstone, and the Canadian Rockies are possibilities for future years. Next year it is hoped that our main outing will be taken in conjunction with the Mazama Club to Mt. Shasta, and perhaps Crater Lake and other points of interest.

Those desiring to visit Yosemite this year and take advantage of the special rates sent out in the recent circular letter should send in their names, at least provisionally, to the Secretary, stating what date of departure

between June 15th and July 10th would be preferable; otherwise, it will be impossible to arrange for parties of fifteen in order to get the special rates.

In spite of the unusual expense connected with the Le Conte Memorial Fund this year, the Club's finances were never in better condition.

The Secretary's financial statement coincides with and is embodied in the Treasurer's report.

The Board of Directors which acted last year has been re-elected, and this Board has reorganized and elected the same officers to serve for the year 1902-1903.

Respectfully submitted,

WM. E. COLBY,  
*Secretary of the Sierra Club.*



TREASURER'S REPORT.

FROM MAY 2, 1901, TO MAY 10, 1902.

RECEIPTS.

Cash on hand May 2, 1901.....	\$ 289 85
Total cash received from Secretary.....	1,550 19
	<hr/> \$1,840 04

EXPENDITURES.

Publications .....	\$ 552 55
Printing circulars, notices, receipts, etc.....	20 50
Postage, stationery, and distribution of BULLETINS..	146 58
Room rent (12 months).....	60 00
Clerical work and typewriting (15 months).....	225 00
Yosemite headquarters .....	59 25
Incidentals .....	4 84
Error in payment (redeposited by Secretary).....	26 66
Le Conte Memorial expense.....	277 10

(The Le Conte Memorial Committee has temporarily defrayed \$100 of this expense, which amount is included in "Cash received from Secretary.")

Total expenditures .....	<hr/> \$1,372 48
Cash on hand May 10, 1902.....	467 56
	<hr/> \$1,840 04

Respectfully submitted,

J. N. LE CONTE,  
*Treasurer.*

### REPORT OF THE LE CONTE MEMORIAL COMMITTEE.

The Le Conte Memorial Committee has been actively at work, and has already raised the following amount:—

Cash .....	\$2,426 55
Subscriptions .....	404 00
Total .....	<u>\$2,830 55</u>

The committee has had several plans submitted by prominent architects, and the final plan will be decided upon shortly. A representative of the committee, together with the architect selected, will probably be in the Valley when the Yosemite Commissioners meet there in June, and a site for the proposed lodge will then doubtless be selected.

It will require active work to raise the balance of over \$2,000 required to complete the fund, and it is earnestly requested that all the members interest their friends and secure all the additional subscriptions possible.

Respectfully submitted,

WM. E. COLBY,  
*Secretary and Treasurer of the Le Conte  
Memorial Committee.*

Dated May 15, 1902.

### KING'S RIVER OUTING.

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The Outing Committee herewith presents a few additional matters relating to the King's River trip. Members of the party will find that it will be possible to change and leave, at either Visalia or Sanger, the costume worn on the train from the city, and can there don their camp clothes, which is advisable before taking the long, dusty stage-ride. Arrangements will be made so that anything left, as suggested, at the points named, will be cared for until the return.

Those persons intending to join the main party leaving San Francisco on the 23d of June are advised to purchase their tickets at the Southern Pacific ticket office, 613 Market Street, after June 15th, and some little time prior to the date of departure, in order that they may make reservations for sleeper at the same time. It must be remembered that these special-rate tickets will only be on sale at points where the secretary is notified parties desire to leave.

The membership of the party is practically complete, and in the future the only chance to join the party will be to have one's name placed on a provisional list and take chances of being substituted in the place of some one who finds it impossible to go on the trip.

Mail, to reach members of the outing party while in the King's River Cañon, should be sent "Care of Sierra Club, Millwood, Fresno County, Cal."

At the present writing there is nothing which can be

foreseen to prevent the outing from being a most complete success in every respect, and the finest trip that was ever taken in the mountains of California is assured.

Very respectfully,

WM. E. COLBY, *Chairman,*

J. N. LE CONTE,

E. T. PARSONS,

*Outing Committee.*

## NOTES AND CORRESPONDENCE.

*In addition to longer articles suitable for the body of the magazine, the editor would be glad to receive brief memoranda of all noteworthy trips or explorations, together with brief comment and suggestion on any topics of general interest to the Club. Descriptive or narrative articles, or notes concerning the animals, birds, forests, trails, geology, botany, etc., of the mountains, will be acceptable.*

*The office of the Sierra Club is at Room 45, Merchants' Exchange Building, San Francisco, where all the maps, photographs, and other records of the Club are kept.*

*There are but a few copies on file of No. 3, Vol. I., of the BULLETIN. The Club would like to purchase additional copies of that number, and we hope any member having extra copies will send them to the Secretary.*

## A FLORA OF KING'S RIVER.

By especial request, Miss Alice Eastwood consented to write an article on "A Flora of the South Fork of King's River from Millwood to the Head-Waters of Bubb's Creek." The directors of the Sierra Club have decided to publish this article under a separate cover and charge for the same the sum of seventy-five cents per copy. This publication will be ready for circulation about June 10th. It will contain a number of cuts showing certain ferns of the King's River region. It will be valuable to all persons interested in flowers. Copies may be had by applying to Mr. William E. Colby, Secretary of the Sierra Club.

## TREES ALONG THE TULARE TRAILS.

For general information regarding the Sierran woods, John Muir's two books, "The Mountains of California" and "Our National Parks," are the best, and no mountains and woods have a better interpreter. Miss Eastwood's paper on the plants of the King's River Cañon, printed as a separate publication by the SIERRA CLUB, by especial request, will be exactly what the party needs for a handbook. Miss Eastwood has collected in the cañon more thoroughly than any other botanist. For the trees and shrubs seen on the journey from Sanger to Millwood and for the "zones" of woody plants in the Sierras, the reader is referred to the article on "Zonal Distribution in the Southern Sierra," printed in the SIERRA CLUB BULLETIN,

June, 1901. A limited number of reprints of this remain in my hands, and are freely at the command of such as are interested in the subject.

The following is a complete list of the Conifers found in the Sierra woods from the King's River southward:—

\*In the "Forest Belt" (4,500 to 8,500 feet altitude):—

*Pinus ponderosa*, YELLOW PINE.

*Pinus ponderosa*, var. *Jeffreyi*, BLACK PINE.

*Pinus Lambertiana*, SUGAR PINE.

*Pinus monophylla*, NEVADA NUT PINE.

*Abies concolor*, BLACK FIR.

*Libocedrus decurrens*, INCENSE CEDAR.

*Sequoia gigantea*, "BIG TREE."

*Torreya Californica* (or *Tumion Californicum*), TORREYA (OR CALIFORNIA "NUTMEG").

In the "Subalpine Woods" of the Boreal Zone (8,500 to 11,500 feet):—

*Pinus contorta*, var. *Murrayana*, TAMARACK PINE.

*Pinus monticola*, MOUNTAIN WHITE PINE.

*Pinus Balfouriana*, FOXTAIL PINE.

*Pinus flexilis*.

*Pinus albicaulis*, WHITE-STEMMED PINE.

*Abies magnifica*, SILVER FIR (OR RED-BARKED FIR).

*Abies magnifica*, var. *Shastensis*, SHASTA SILVER FIR.

*Tsuga Mertensiana*, MOUNTAIN HEMLOCK.

*Juniperus occidentalis*, MOUNTAIN JUNIPER.

The Pines are distinguished by long needles, usually more than one in a cluster, wrapped at the base by a thin sheath.

The Firs are known by their oblong cones, all erect on the topmost branches; needles single, no sheath.

The Hemlock is distinguished by its short, single needles, hanging cones, and slender, drooping tops.

The Cedar has small scalelike, opposite green leaves in a flat branch, and bark like a "Big Tree."

The Big Tree by its size, cinnamon-colored bark, scalelike, scattered leaves, and cypress-like cones.

The Juniper by its scalelike leaves and small fleshy cones, like blueberries.

The Torreya has long, sharp needles and a fruit like a green plum.

The writer has botanized over the great mountain land

\*See "Zonal Distribution," BULLETIN, June, 1901, p. 301.

south of the King's River, in the Kern, Kaweah, and Tule river basins, nearly every season since 1895, and will here indicate some of the best localities for observing the above species of trees. This region is the true home of the Big Tree. Excluding the Tule River and the southern part of the Kern, where few of this year's party are likely to go, one may find thirteen groves of Sequoia, all on the slopes of the five forks of the Kaweah River. Two of these, the Giant Forest and that on the Mineral King road, are the largest that exist.

The most interesting trail south of the King's River watershed is that from the General Grant Park to the Giant Forest and Mineral King, via Alta Meadow. About two miles west of Big Meadows this trail starts for Halsted Meadow and the Giant Forest. Around the Big Meadows is a pure forest of Tamarack Pine, known by its small cones and two leaves in a sheath. Near and below the gap into the North Kaweah is *Abies magnifica* (the variety *Shastensis*, more common than the type, occurs everywhere intermingled with it). These two species indicate the Boreal, or the same zone as the country about the Tuolumne Meadows. Descending, the first grove of Sequoias appears near the level of Dorst Creek. Across the creek on a bold promontory one can see the Redwood Saddle grove, containing many fine Sequoias. Passing among the trees of the Forest Belt, one ascends again into the Boreal, north and about Halsted Meadow. From Halsted Meadow to the Marble Fork one is again among the trees of the Forest Belt. Black Firs, with leaves longer and broader than the Silver Fir, and forming a flat branch instead of spreading in every direction, Sugar Pines, Cedars, Yellow Pine, and one small grove of Sequoias are passed. Ascending to the Giant Forest, you are in the most beautiful woods of the Forest Belt in the Southern Sierra, as well as the largest grove of Sequoias.

A long rest here, with side excursions, will be enjoyed. Passing eastward through Panther Gap, the trail rapidly rises a thousand feet, where you enter among fine trees of *Pinus monticola* and the Silver Fir. Beyond Alta Meadow a new species of pine—the Foxtail Pine—will be seen at the left among the rocks of the ridge high above the trail. The trees are scattered, dwarfed, with tops bending up the mountain. The Boreal continues with slight interruption until you near the Middle Kaweah, beyond which is Redwood Meadow, a beautiful Sequoia meadow. Along the Cliff Creek trail are more Big Trees; and after the crossing is made and a fine

glacial moraine is passed, you ascend Deer Cañon, rich in flowers. At its head is Timber Gap and fine woods of the sub-alpine Silver Fir and Mountain Pine. Beyond are the brightly-colored peaks around Mineral King and Farewell Gap. From Mineral King, by road toward Three Rivers, the woods change again to the Forest Belt. About Atwill's Mill, on this road, is a Sequoia grove, originally one of the largest. After the road enters the chaparral, it recedes again and passes the lowermost Sequoias of Redwood Cañon. Here in the same ravine is *Torreya*, with its dark, glossy, prickly leaves. Southward across the great bushy cañon of the East Kaweah still other groves of Sequoias can be discerned.

The finest groves of Foxtail Pine are east of the Western Divide, at the southern base of the great Kaweah peaks, and west of Sheep Mountain on the Mt. Whitney trail. They form the upper fringe of the woods at timber line. *Pinus albicaulis*, the most nearly alpine of the Coniferae south of the King's River, only appears at rare intervals, dwarfed and scattered, among the rocky corries and high cañons. The Nut Pine, besides its remarkable occurrence in King's River Cañon, is found rarely along the Kern River cliffs and eastward. The Juniper is along the trail south of Farewell Gap, and occasional about Mt. Silliman and Mt. Whitney.

Stanford University.

WILLIAM R. DUDLEY.

#### A WINTER TRIP TO KING'S RIVER CAÑON.

Most of us born in California know Nature only in brown and yellow and green; it is not given to us to watch her asleep in winter robes of white. It was the wish for a glimpse of her in the guise our fathers were favored to see her in, that last December led myself and my brother, Mr. R. H. Kelley, into her mountain realm. Christmas morning found us at breakfast among banks of snow a few miles from Millwood.

The day is all but the shortest of the year; we have far to go and come; we shoulder our packs and push on. How still the woods! how fresh the frosty air! how beautiful and strange to us the snow! There is a creek that drains a meadow this side the high ridge east of Millwood; the creek was ice: we walked on it, all ragged and twisted,—for stones and grass and sticks had had their way in its midst. We were like children. And up the steep meadow, at its top, was much snow, where first it covered the trail. Thus the old path of a dozen summer tramps took on new fashions, for which one pair of eyes could never suffice.



Luncheon at Long Meadows cabin,—Long Meadows, still, serene, mild, yet we must break thick crusts of ice to get our water. And then, who having crossed it does not remember, a half-hour up from Ten-Mile Creek towards Tornado Meadows, the great, quiet, piny plateau?—the same as in summer, yet so different, whether really or because we chose to have it so. For but little snow was here; indeed, we kept on our coats hardly ever the whole trip through. But Tornado Meadows was all snow, so thick, so soft, so glistening. The solitude was most solemn; the great recess of snowy, matted logs and shivered stumps where is said to have risen first the whirlwind that gave the place its name, calls up Jötunheim and the Norseland giants. A stag springs through the brush and stands across an open gulch to watch us,—long stands there, and we watch him, a noble fellow, a stag of eight, I think. We were glad we had no gun. Was not our pleasure in seeing him one with our satisfaction in having the mountains to ourselves, as if the world were ours for a while?

Christmas supper, better than turkey and plum-pudding, on a slope looking over the meadow fading into darkness; a fire too generous for the weather, but burning in the true spirit of camp-fires; long sleep on fir boughs, bed too good for the best of men; verily, a Christmas ever to hold in mind. The next night found us at Rattlesnake Camp, an hour beyond Boulder Creek, and the next night we passed at Camp Kanawyer, in King's River Cañon.

The trip had been one of the most curious variety to us. Most of the small creeks were frozen solid, scenes we had known before only through pictures; yet the air was very mild, and at Boulder Creek almost like early summer. Much depended on the direction of the slope. Kennedy Meadows, 7,000 feet (I think), with a southern exposure, we found quite open, in contrast with Tornado Meadows close by on the north side of the same ridge. But the creek that drains the former babbled delightfully through icy banks and crystal pendants.

Mr. Kanawyer had thrown his hospitality at Millwood on ahead, and bidden us make free with his camp on Copper Creek. Here we spent two nights. The day between (it was Saturday) we spent in one of the most fascinating scrambles I have ever known, up the river to the fine fall in what is sometimes called Paradise Cañon. Every one remembers the magnificent sheer walls of this chasm, and the tumbling cascades in the river. Pity that the water was so low;

nevertheless, the falls were lovely, and our photographs show plainly the snow on the rocks at their base. Yet we had sweated on the way up as if it had been July.

The rest of the afternoon we passed in replenishing, with usury, Mr. Kanawyer's woodpile. The next day (Sunday) we began our return march about noon, with a circuit to include Roaring River Falls, which are low but ideal in their beauty of granite setting, and which gave us a most satisfactory photograph. This same afternoon we got, also, pictures of two scenes that gave us more of the delight of novelty than any others. One was a cascade in Granite Creek all choked with ice,—I cannot describe it any further. The other was the strange union of ice and rock in some places in the river where there was a gentle ripple. The ice had gathered thick around the rock, whether on the shore or in midstream, and then had been carved out by the current into knobs or tassels (quite symmetrical, and big enough to fill a teacup) that made you a massive crystal fringe. Yes, there was one other thing as new and charming to us; that was the grass and low shrubs incrustated with great jewels of snow. Yes, and the snow of the ground in its three formations,—fine, like sand, coarse, like big gravel, and flaky, like wafers of ice.

Sunday night found us at the foot of the cañon, Monday night near a great field of snow in the redwoods of Lockwood Creek; for out of Boulder we took the old lower trail, now little used, through Windy Gorge, Lockwood Creek, and Redwood Creek, instead of Kanawyer's new trail through Kennedy and Tornado meadows. Much of this is the wildest unaxed forest country imaginable.

In Long Meadows we heard a jocund bray, and found the camp equipment of a hunting party, but the other-worldliness of our journey was unspoiled by meeting the men themselves. Tuesday night brought us to Huckleberry, and the greatest part of Wednesday we spent in company of the giants of the General Grant Park. Mr. and Mrs. Kanawyer were expecting us at Millwood with a hearty welcome, and we must admit that we had no longing that Wednesday evening for our bi-daily stew of bacon, dried beef, rice, and bread-crumbs. This night it rained for the first time in two weeks. Our only disappointment is that we saw no snow-storm, not even the falling of a single flake, all the time we were out. Yet, from the point of view of safety, I suppose we were very fortunate.

I cannot forbear to add just a word about the next day, when we left Millwood, still afoot. It was showery, so we

rather looked for something fine to view when we reached the top of the ridge. Yes, there it was: not the magnificent sea of fog that we gazed down upon from the same place two years ago,—with island and cape and bay where the hills made the coast-line, with the wind in the pines to give sound to the rolling breakers on this mist-ocean's shore,—but a marvelous vista between the broken sky above and the long reach of hill and plain below, prodigal in beauty of color and form,—cloud against peak, cloud against cloud, wisps of cloud caught in hillside thickets, clouds being born of wet little valleys and rising to join their fellows in the sky, columns of rain between cloud and earth, rents in the clouds where the sun streamed glorious through;—you cannot applaud these Titan shows, you stand mute with thankful reverence.

TRACY RANDALL KELLEY.

#### ICE-CAVES.

In a recent number of the *National Geographic Magazine* there appears in the Geographic Notes an article about curious ice-caves in limestone, which reminds me of my experience with ice-caves in the lava regions of California.

In the summer of 1886 I was in charge of the topographic work for the United States Geological Survey, mapping the Modoc lava fields, in Modoc and Siskiyou counties. (A rough sketch of a portion of this map will be found in Vol. II, No. 6, of the *SIERRA CLUB BULLETIN*.) At Yreka we were told of a body of ice in a cave about half-way across the lava bed, where we could obtain water. The country is very rugged and dry. In most cases the lava is sparsely wooded, but sometimes not even a tree can be seen to enliven the dreary waste of lava and pumice. The distance is about forty miles across the lava-bed from Butte Creek to Dry Lake.

Upon leaving Willow Creek, the last water, we filled our water-barrels for precaution. The road or trail was along the edge of the lava cliffs upon a bed of pumice. The contrast between the dark lava and white pumice was very marked, and especially trying to the eyes in the heat of the sun.

A day or two of this work soon began to lower the contents of our barrels, and we arrived at a point where we thought we might find the ice-cave. We were at first somewhat bewildered at such a quest, but one of the party noted the flight of some birds and we reasoned that water must be near. Following this general given direction, in a short time we found a small but regular beaten trail, and taking this, it led us right down under the lava. We went down some seventy-

five or a hundred feet on an incline of about twenty-five or thirty degrees. Here the atmosphere was much cooler and a great relief from the heat and glare outside. When we became somewhat accustomed to the darkness, we saw below us a pool of water fifteen or twenty feet long by about the same in width, and on the farther edge quite a block of ice.

With the thermometer at 120 degrees on the surface above, one can imagine the luxury of this unexpected draught of ice-water.

We picked up a few pieces of the ice and returned to our companions. One of them had been decidedly sick for a few days, and when we suggested a dish of crushed ice he looked extremely miserable. To see his surprised, bewildered expression when we exposed the ice was something to remember.

Making the cave our base camp, we mapped the surrounding country, occupying and naming the highest peak Hoffman (after Prof. John D. Hoffman).

From this peak we saw quite a body of water to the south completely surrounded by lava ridges and obsidian cliffs.

We camped afterwards for some time there, and found the Indians called it Medicine Lake; so we retained the name.

It is a delightful place of recreation for the geologist or the sportsman, as large mule-deer are still to be found in the vicinity, and a little west of the lake toward Mount Shasta we came across quite a band of antelope.

There seems a general cleft, or line of fissuring, extending for some distance in a regular north-and-south direction, for another ice-cave is found south of Medicine Lake in a cave or slip of this nature, and still farther south there is another near the Mayfield road. The latter is large enough to give an occasional supply of ice to the neighboring towns during the summer months.

Within a mile or two of these caves can always be found a subsidiary cinder-cone four hundred or five hundred feet in height, following along the general north-and-south break above mentioned.

MARK B. KERR.

Grass Valley, Cal., January, 1902.

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#### NOTES CONCERNING THE BRIGHT ANGEL AND HANCE TRAILS, GRAND CAÑON OF ARIZONA.

In the vicinity of Bright Angel Hotel there are four trails that start at the rim of the Grand Cañon and lead down the precipices to the river below: (1) About twenty-six miles west of the Bright Angel Trail, starting at Bass Camp (or

Surprise Outlook), is the Mystic Spring Trail. (2) The Bright Angel Trail, which begins at the hotel of that name. (3) Sixteen miles east of Bright Angel Hotel may be found the Grand View Trail, with the Grand View Hotel (or Berry's) near by. (4) Three miles and a half still farther east Hance's Trail begins its descent to the chasm below. The rough sketch map on page 80 of this number will indicate the relative positions of these trails.

A description of the Mystic Spring Trail may be found in "Sierra Club Bulletin," Vol. III, No. 4 (June, 1901). The following notes will concern themselves with the Bright Angel Trail and the Hance Trail, or New Hance Trail, which is also known as the Red Cañon Trail. (I have omitted all mention of two other trails in this vicinity, because both are closed. One is the Old Hance Trail, starting from the same point as the New Hance Trail, but working down by a series of gorges to the west. For five years past it has not been used because of washouts. The other one is called the Tanner Trail, and is still farther to the east, only a few miles west of the Little Colorado River. This trail, also, is now completely closed.)

#### THE BRIGHT ANGEL TRAIL.

On December 29, 1900, we started from Bright Angel Hotel, with J. R. Halford as guide. The trail starts right at the hotel and goes east for about one hundred feet, then zigzags down a fault in the cliff. Soon we came opposite to a magnificent yellow limestone wall four hundred feet high and a half mile long. This stratum measures several hundred feet in thickness and overlays a stratum of red sandstone, into which we soon descend by our precipitous trail. The magnificent promontory called "The Battleship Iowa" is in this formation, and thrusts its prow into the abyss. We work down a gorge, with this leviathan battleship on our left. Down, down, with new precipices hemming us in, we still descend. Soon the trail becomes exceedingly steep, and we dismount, letting our animals get down as best they may.

The next formation is blue limestone. This formation has the red-sandstone tinge, however, due to the stain from the red sandstone above, my guide says. The view of the opposite cliffs is always magnificent. To our right and across the chasm is a red-sandstone pile capped by a pillar of yellow sandstone. The Bright Angel Cañon (a part of the great north-and-south fault down which we are working) is directly opposite us, and its chasms are dark and forbidding, in spite of the bright sunlight that streams into their depths. Up

this gorge many claims have been located rich in copper, gold, and silver. Through all this vast stretch, east and west, north and south, as far as the eye can reach, not a tree is to be seen. Here and there we pass a spruce, a piñon, a cedar, but all these trees are small, and make no impression on the distant landscape.

Below the blue limestone is a frangible shale of marked green color. Here we come to a broad plateau, where are located the Indian Gardens, well known to all explorers. Springs gush from the earth, and there are old irrigating ditches, some of them still carrying water. Willows abound. Here the Indians tilled the ground not so many generations ago. My guide says, "Most anything can be grown here."

We could at this point take a trail to the left, which would lead us out over the plateau to its edge, whence we could look down over a granite cliff upon the river below. But our errand takes us to the river itself, and our path follows the slender stream from the Indian Gardens. Looking back from the Indian Gardens through a narrow chasm, we see the hotel far above, the smoke from the hotel chimneys giving signs of life. Still descending, and veering to the east, we leave the extensive plateau beyond the Gardens, and are in a stratum of carboniferous sandstone. Under the lee of a huge cliff of this rock we tie our horses, for the trail from this point to the river is too steep and difficult for quadrupeds. We have traversed four miles of our journey. It is now half-past 11; so that this part of the trip has occupied two hours.

Almost directly opposite this tying-place, across the gorge, are a number of cliff-dwellings, built into the sandstone wall. Their neat and careful masonry gives them a most attractive look. On the way back Halford holds the horses at this point, and I go across to explore. A four-minute slide down the rocks and a stiff ten-minute climb up the opposite talus brings me to the cliff into which the dwellings, or granaries, are built. I sketched them as best I could, and, climbing along a rocky ledge, explored one tier of them. The ledge, or embrasure, was one hundred and twenty feet long, with a height of between three and four feet from the floor to the overhanging rock. This particular ledge was about twenty feet above the foot of the cliff.

The first room that I entered was five by six feet in size, with an adjoining closet measuring two by three feet. Then came a vacant space of a few feet, succeeded by two rooms about five by six feet each, with entrances at each side. The mortar that had been used had been made of red-sandstone

dust, with a slight admixture of straw. It was in no sense a cement, for it was brittle, and with ease any of the walls might be pushed in. About one hundred feet above the ledge which I explored were other dwellings. Had time permitted, it is possible that I could have reached these also. Halford told me that down in the cañon below the Indian Gardens and around the point from the cliff-dwellings are the remains of ditches. This shows that in earlier times water could have been brought very close to where the cliff-dwellings, or caches, are situated. My guide's opinion was that these structures were caches pure and simple, and that the Indians sealed them up and thus protected them from rats and other vermin.

Resuming our journey to the river, we walk, or rather slide, down a precipitous talus. At the head of this talus, looking eastward along its edge, we see in the outline of the overhanging cliff of carboniferous sandstone a huge but perfect profile of a man's face. The resemblance was a striking one, and I wonder that photographs of this and of the interesting cliff-dwellings are not to be seen in the collections of pictures of this region.

At the bottom of the talus we reach Pipe Creek, which carries a slender stream of pure water. We then follow the creek bed, and soon see a beautiful fall seventy feet high. Before long Pipe Creek opens into Spring Garden Gorge, which carries a heavy stream of water, and in a few minutes we behold these clear and sparkling waters emptying into the Colorado River. The river is lower now than at any other time of the year, and is three hundred feet wide. The granite formation began where we left our horses, and our descent from that point measures fifteen hundred feet.

In the sand beside the river we see the tracks of mountain sheep. We find also some tiny dots in the incrusted sand, in groups of four. These are the tracks of the kangaroo rat.

#### THE HANCE TRAIL.

Of the three trails that I have traversed, I should place the Mystic Spring Trail as by long odds the most interesting, both scenically and geologically. Next in interest would come the Bright Angel Trail, and last the Hance Trail. But let it not be supposed that I consider the Hance Trail in even a slight degree uninteresting. Far from it. Moreover, if one can secure the offices of Captain John Hance, the builder of this trail and a pioneer in this region, as guide, information will be forthcoming that may be had in no other way. Cap-



tain Hance has a rare sort of humor, too, and his quaint tales of adventure are likely to live long after he himself is in the grave. Halford characterizes him thus: "Hance tells big stories, but don't expect people to believe 'em, and when he sets down to tell gospel truth, you kin reckon that he's tellin' yer gospel truth."

It was in company with Captain John Hance that I started down the Hance Trail, on December 29, 1901. The Captain came over from his cabin to the Grand View Hotel, where we mounted our horses. Thence we made our way along the rim eastward for two miles to Hance's Hotel, and thence a mile and a half farther eastward to the beginning of the Hance Trail, or New Hance Trail, also known as the Red Cañon Trail. (As already stated, the Old Hance Trail is washed out and impassable.)

All along the rim the dominating object of vision is Ayer Peak, a great pile of yellow sandstone, somewhat isolated from the main wall, its features and outlines constantly changing as one moves to the east or to the west. In descending the Hance Trail, we shall move to the east of Ayer Peak.

At the head of the Hance Trail are to be found a neat cabin and good stables, built and owned by Captain Hance. Our path to the river will be eight miles. The first mile is a picturesque rim-trail, and we gradually work out upon a promontory, down whose farther side we shall make a rapid descent. Ayer's Peak keeps us company on the left, and to the right Bissell Point and Moran Point stand out majestically. Looking west as we move down, we can see in the farthest distance the Cannon Copper Mine, on the Grand View Trail. An interesting feature is a sandstone chimney half a mile east of Hance's cabin, and near the trail—a pillar of rock separate from the main cliff, but showing what Hance claims are unmistakable signs of old Indian fortifications. A cache, or granary, can be seen under the main point of rock near by.

Making steady descent, we reach the top of the blue limestone at 11 A. M. (we left Grand View Hotel at 8 A. M.), having descended the lower strata of the red sandstone by following a precipitous wash filled with boulders.

From this point on we find ourselves in irregular strata, which line each side of the steep and difficult wash. We reached the river at 12:30 P. M., where we found L. D. Boucher (one of Hance's men), a tent, a fire, burros, and supplies.

WILLIAM A. BREWER.



## GRAND CAÑON EXCURSION.

## ADDITIONAL INFORMATION.

The information to be given under this heading was promised on the first page of the little pamphlet that formed a sort of prospectus of the excursion. So short a time, however, has passed since the appearance of the pamphlet that there is not a great deal to add.

The attention of all the excursionists is again drawn to the importance of notifying us as soon as convenient of an intention to join the main party of July 14th; also of heeding carefully the other points referred to on page 21 of the pamphlet. Such action on their part will enable us to provide carefully for the comfort of every excursionist, both *en route* and after reaching his destination. It will also enable us to send down an advance-agent in good season, if the size of the party warrants it. Then, again, too long a delay may be a bar to joining this main party of July 14th, as the party will have to be limited, and, with two or three exceptions, all yet heard from have expressed a desire to go on this date.

## HOUR OF MAIN PARTY'S DEPARTURE—NOTICE TO KING'S RIVER PARTY.

The main party just referred to will leave San Francisco on Monday, July 14th, on the limited, at 9 A. M., unless subsequent notice is given of a change of hour. Before July, however, a new train may be put on, making a close connection for the cañon, and, if so, that train will be our probable choice. And if the party numbers fifty, it can be transferred without delay from the main line to the cañon.

A number of the King's River party having expressed a desire to join this main party *en route*, their attention is drawn to the starting-time of the Santa Fe trains from San Francisco (where they must join us) to the south. The 9 A. M. train from San Francisco, for example, is very rapid, leaving Fresno at 2:40 P. M. In this connection, it should be added that any of the King's River party who go on to the Grand Cañon, or any of the Grand Cañon party who go first to King's River, should purchase their tickets through to Grand Cañon and stop off at Fresno, going thence to Sanger (fourteen miles from Fresno by the Southern Pacific) and King's River; and they should announce their intention to do so to Mr. Colby, Secretary of the Sierra Club, or Mr. Chetwood, Chairman Grand Cañon Outing Committee. If those who go to King's River subsequently decide to go to Grand Cañon, they can do so, but will have to pay the same fare from Fresno

to Grand Cañon as they would have paid from San Francisco. The Santa Fe rates for this excursion will be those already announced in the pamphlets (\$35 for fifty persons, and \$40 for from ten to fifty). And these rates will prevail not only from San Francisco, but from Los Angeles, and be the same from any intermediate point between either city and Grand Cañon.

#### ADVANCE PARTIES AND INDIVIDUAL PARTIES.

The advance party spoken of in the pamphlet as probably starting early in June seems at present rather inclined to join the main party. Any excursionists desiring to start earlier than July 14th are asked to so state and name the time preferred, when, if possible, a party of ten will be made up, after which another of the same size will follow. In this connection, a correction should be made of a statement in pamphlet, made through a misunderstanding. Parties of ten and less than fifty will be entitled to a \$35 rate only if a total of fifty has been reached when small party starts, and not to a rebate if the total number subsequently becomes fifty.

#### QUESTIONS ANSWERED.

The answers to questions promised in the pamphlet, and not already answered, concern hammocks, food, and the possibility of leading entirely a camp life after leaving the cañon.

Hammocks, being light weight and easily packed, might be quite useful in some cases. Those unaccustomed to sleeping on the ground often find easier and more comfortable repose in a hammock, above insects that may creep about below, and also above dampness after a shower.

No food-stuffs are necessary or recommended on this trip, except a little chocolate for an emergency, packed in tin or tinfoil, and perhaps some coffee. Both these articles are to be obtained of Goldberg, Bowen & Co., who advertise in this *BULLETIN*, and whom therefore excursionists are asked to patronize. Several lunches, and perhaps one or two breakfasts, will for the majority be cold meals. Those who desire to add to them a cup of hot coffee are advised to take a pound can of Borden's condensed coffee. One of these cans will make ten or a dozen average-sized cups. Sugar and milk being condensed with the coffee, the beverage is instantly made by dissolving a teaspoonful in a cup of boiling water. Served fresh, it makes a fair substitute for coffee, and when fresh milk or cream can be added an excellent one, as may be ascertained at Maskey's on Kearny Street.

As for those who propose to make the trip entirely a camping one, except for three or four days at the cañon, the plan is quite feasible. One can procure food at Flagstaff, and after leaving that point travel in any desired direction, taking pack-animals and food, as well as tent or bedding. In fact, most of this trip may be made in any style preferred. The tourist may take nearly every meal in a hotel or restaurant, and share a spring mattress with the companion of his choice; or he may enjoy home-cooking *al fresco*, and sleep on Mother Earth—with possibly an occasional companion not of his choice.

GENERAL PROSPECTS OF THE EXCURSION.

These are excellent. Dr. Jordan, one of our directors, is, unfortunately for us, engaged for work at Samoa this summer with the U. S. Fish Commission, and so sends regrets that he "cannot take part in this grand excursion of the Sierra Club." But we hope to have representatives from one if not both universities. Charles F. Lummis, editor of *Out West* and author of "The Great Southwest," "Land of Poco Tiempo," etc., writes from Los Angeles that, while he cannot speak at all positively, he hopes to go. C. Hart Merriam, of the Smithsonian Institution, goes to King's River, but has been specially invited to join us later, and those who met him on last year's outing in the High Sierra and listened to his description of the fauna of that region know what an acquisition he is to any party. In a pamphlet describing the San Francisco Mountain region, Dr. Merriam is reported to have said that within twenty-five miles northeast of the summit of the range are specimens of flora and fauna of every life-zone from the arctic to the semi-tropic. No other known area of equal size on the globe makes such a showing, or offers greater interest and opportunity to the botanist and biologist, to say nothing of the geologist, while if the twenty-five mile radius be extended completely around the circle, there is a great deal within it to attract also the ethnologist and archæologist.

Mr. John Muir, our President, is also booked for King's River Cañon. But as the outing in that direction will be nearly over when our party passes Fresno, it is hoped the President of the Club will join us there, or come on a little later. He cannot doubt what his welcome will be. His late book, "Our National Parks," is spoken of in another page. But admirable companion for an outing as that volume has been admitted to be, we do not want to take it along as a substitute for the author.

## FUTURE ANNOUNCEMENTS.

As the general plan of the trip and the various possible variations from it have now been so fully covered, further information should be superfluous except for individual cases. A circular letter, however, with final instructions, will probably be sent to all members of the excursion. And during Saturdays in June some one will be prepared to answer questions between 1 and 1:30 P. M. at the Club headquarters, room 45, Merchants' Exchange Building, San Francisco.

The supply of Grand Cañon pamphlets being almost exhausted, members of the Club not going on the excursion or needing the pamphlets will confer a favor by mailing their copies in one-cent unsealed envelopes to Sierra Club Grand Cañon Excursion, Merchants' Exchange Building, San Francisco.

JOHN CHETWOOD,

*Chairman Grand Cañon Outing Committee.*

SAN FRANCISCO, CAL., April 25, 1902.

MR. J. S. HUTCHINSON, JR.

MY DEAR SIR: In hurriedly compiling at the end of our little pamphlet on the Grand Cañon excursion some of the "literature" on the region, I omitted to refer to Mr. Muir's recent book, "Our National Parks." In this book the President of the Sierra Club appeals irresistibly to all lovers of nature, animate or inanimate, and whether his readers be learned or unlearned. A more charming, helpful, or enthusiastic companion for an outing than this volume would be hard to find.

Mr. Muir simply treats the Grand Cañon as a part of our system of national parks, and his reference to it is brief, but I am sure it will interest all readers of this BULLETIN, especially those who go with us to the Cañon. And I beg that you will reprint the following selection from "Our National Parks" in the BULLETIN. By so doing you will, I am sure, oblige the other members of the Club, as well as,

Yours sincerely,

JOHN CHETWOOD.

JOHN MUIR'S IMPRESSIONS OF THE GRAND CAÑON.

(Extracts from "Our National Parks.")

"The Grand Cañon Reserve of Arizona, of nearly two million acres, or the most interesting part of it, as well as the Rainier region, should be made into a national park, on account of their supreme grandeur and beauty. Setting out from Flagstaff" (nowadays from Williams), "a station on the Atchison, Topeka and Santa Fe Railroad, on the way to the

cañon you pass through beautiful forests of yellow pine—like those of the Black Hills, but more extensive—and curious dwarf forests of nut-pine and juniper, the spaces between the miniature trees planted with many interesting species of eriogonum, yucca, and cactus. After riding or walking seventy-five miles through these pleasure-grounds" (which we degenerate tourists will traverse by rail), "the San Francisco Mountains, abounding in flowery parklike openings and smooth, shallow valleys, with long vistas which in fineness of finish and arrangement suggest the work of a consummate landscape artist, watching you all the way, you come to the most tremendous cañon in the world. It is abruptly countersunk in the forest plateau, so that you see nothing of it until you are suddenly stopped on its brink, with its immeasurable wealth of divinely colored and sculptured buildings before you and beneath you. No matter how far you have wandered hitherto, or how many famous gorges and valleys you have seen, this one, the Grand Cañon of the Colorado, will seem as novel to you, as unearthly in the color and grandeur and quantity of its architecture, as if you had found it after death, on some other star; so incomparably lovely and grand and supreme is it above all the other cañons in our fire-molded, earthquake-shaken, wave-washed, and glacier-sculptured world. It is about six thousand feet deep where you first see it, and from rim to rim ten to fifteen miles wide. Instead of being dependent for interest upon waterfalls, depth, wall-sculpture, and beauty of parklike floor, like most other great cañons, it has no waterfalls in sight and no appreciable floor space. The big river has just room enough to flow and roar obscurely, here and there groping its way as best it can, like a weary, murmuring, overlaid traveler trying to escape from the tremendous, bewildering labyrinthic abyss, while its roar serves only to deepen the silence. Instead of being filled with air, the vast space between the walls is crowded with Nature's grandest buildings,—a sublime city of them, painted in every color, and adorned with richly fretted cornice and battlement, spire and tower, in endless variety of style and architecture. Every architectural invention of man has been anticipated, and far more, in this grandest of God's terrestrial cities." (Page 34.)

#### A SHORT CUT TO THE GRAND CAÑON.

Nearly every railroad across the continent is at some point close to objects of great natural or archæologic interest. This is especially true of the Santa Fe Railroad across Northern Arizona, with petrified forests near by, and historic and prehistoric ruins, to say nothing of that wonderland, the Grand Cañon of the Colorado, by far "the greatest thing in the world" of its kind. From Williams or Flagstaff, on this line, the brink of the chasm is reached, some seven thousand feet in air. To arrive at the river, requires several hours of decidedly adventurous clambering. A much shorter road runs from

Peach Springs, Arizona. A few years ago this route was patronized to some extent, being open all the year, except during the short rainy season; but the heat was apt to be excessive in summer, though the air of all this region is remarkably dry, pure, and invigorating. For prolonged physical exertion it surpasses that of California.

From Peach Springs to the cañon the road for about half the distance used to be very fair. Then it became poor, and during the latter part of its course was about as rough as cañon roads in the path of freshets are apt to be. But the slower rate of progress had ample compensations; for, as the road degenerates, the surroundings become more and more impressive. Indeed, in leaving the station one leaves the tame and commonplace. Wildness, succeeded by grandeur, soon begins to take their place. As the road descends, the walls of Peach Spring Cañon rise. Then they tower aloft, and finally, through no unworthy portal, usher silent mortals into the depths beyond. We seem to reach the very heart of things. This whole region has been molded by Titanic forces. It is Nature's mighty workshop, and many of her secrets are laid bare; for these stupendous walls and the strata of age succeeding age tell the geologist the story of the earth. Nowhere else is the story so complete. The mouth of Peach Spring Cañon opens on a tremendous picture, with the great, mysterious river in the foreground. It thunders and surges downward over a granite bed and pent up between granite walls a hundred and fifty yards apart and several thousand feet in height; and from below they look perpendicular. Indeed, they are so for many hundred feet. At this great depth there are some places where daylight does not linger, and at all times vast shadows brood over the stream. It calls to mind the familiar but weird and striking lines,—

"Where Alph, the sacred river, ran,  
Through caverns *measureless to man*,  
Down to a *sunless sea*."

Again the gorge opens out, and the water flows through deep but quiet pools. Before the cañon itself poetry falters, and certain separate features of it are all that sober prose may attempt. Palette, pen, and camera are all inadequate, and the best photography of large or distant objects has many limitations. One difficulty is that all standards of measurement fail. This cañon so dwarfs all others that there is nothing in nature to compare it to. At many points the walls of Yosemite would not reach half-way up its sides, nor would those of the Royal Gorge in the State of Colorado,

through which pass the trains of the Denver and Rio Grande. And the altitudes of the side cañons are in places fully as great. From Sunset Peak, which apparently belongs to Peach Spring Cañon, one can look down on any point near the river; and farther up Peach Spring Cañon is a still loftier crest. The Grand Cañon alone is more than two hundred miles long and about fifteen miles from brim to brim, with walls at many points ranging from four to over six thousand feet in height.

Opposite the mouth of Peach Spring Cañon "Solomon's Temple" lifts its majestic dome. Farther up, Mount Emma is pointed out. Near by are "The Tower of Babel" and other mighty peaks, while on the left the river makes an abrupt bend and whirls away toward the Black Cañon. In the immediate neighborhood several objects stand out prominently, all accessible, some by a moderate walk, others after a vigorous climb. To Prospect Point, near the river, is a short and in this climate not difficult ascent, which well repays the effort. After a few minutes' climb the cañon world around begins to unfold like a map, disclosing new beauties at every turn of the path.

Diamond Creek Cañon, opening out of Peach Spring Cañon, rather resembles in some ways the Black Cañon of the Gunnison in Colorado. Its walls in places rise sheer nearly three thousand feet, and are barely twenty feet apart. One can walk up this cañon for miles, and its inner recesses the sun does not seem to penetrate at all, shut out by massive walls or the towering crags that crown them. Diamond Creek flows down this defile. It is well named. The water is cool and sparkling in the warmest weather, and extremely palatable. It is probably charged with mineral to some extent, though not perceptibly. Traces of iron and soda are plentiful about.

Among the landmarks of this place are Pyramid and Sunset Peaks. The half-dome of Sunset is gilded by the last rays of the sun after all other points are in shadow, as seen from the lower cañon. From the summit of this mountain the panorama is magnificent, but whoever scales it would best allow a day for the trip. So clear is the air that the range of vision is almost limitless. One looks down on Solomon's Temple across the river, and even on the loftier benches that flank it. A winding silver thread far below marks the river's course, and a perfect network of cañons branches out on either side. These cañons are practically inaccessible, except from the river; but by a little steam or

electric launch, or by a good row-boat at some seasons, the river could readily be crossed at a few points, and by skirting either bank many a side cañon would open to the explorer.

JOHN CHETWOOD,

LETTER FROM CAPT. N. F. McCLURE.

MANILA, P. I., April 9, 1902.

To the Editor SIERRA CLUB BULLETIN, San Francisco, Cal.

DEAR SIR: I still have the two Sierra Club record-boxes given me by Mr. Elliott McAllister, but have not yet had an opportunity to deposit them on any prominent peak. I hope to be able to place one of them in position myself, and to turn the other one over to some one who will place it in case I am unable to do so. Thus far I have been stationed at a distance from the mountains, and have not been able to get away on a climbing trip. I do not despair, however, of being able to go yet before I return.

We have some very respectably sized mountains here, too. I will give you a few below:—

Mount Arayat . . . . .	3,200 feet
Mount Pinatubo . . . . .	5,200 feet
Mount Tabo (Luzon) . . . . .	4,200 feet
Mount Isarog (Luzon) . . . . .	6,900 feet
Mount Mayen (Luzon) . . . . .	6,200 feet
Mount Nangtud (Panay) . . . . .	6,800 feet
Mount Midia-as (Panay) . . . . .	7,100 feet
Mount Banajao (Luzon) . . . . .	6,700 feet
Mount San Cristobal (Luzon) . . . . .	6,200 feet
Mount Tugsig (Luzon) . . . . .	5,100 feet
Mount Tugsen (Luzon) . . . . .	5,300 feet
Mount Data (Luzon) . . . . .	8,100 feet

These mountains are given in Spanish figures, which are more or less unreliable, but there are doubtless many high mountains in these islands—mountains rising about 6,000 feet. Mount Arayat, though not very high, rises alone from the center of a vast valley, which valley is almost flat. Hence Arayat, though not of great altitude, is in reality one of the most prominent and most noticeable peaks of the archipelago. It is plainly visible from Manila.

Hoping to soon give a better account of my stewardship, I will close with best wishes for the Sierra Club and its continued success.

Yours sincerely,

N. F. McCLURE,

Capt. and Q. M., 5th Cavalry.



## FORESTRY NOTES.

EDITED BY PROFESSOR WILLIAM R. DUDLEY.

NEW FOREST  
RESERVES.

The late President McKinley created the Wichita Forest Reserve (57,120 acres) in Oklahoma Territory, on July 4, 1901. On August 8th he declared a reserve in Utah of 86,400 acres, which has been named the Payson Forest Reserve. These are numbered 40 and 41, respectively, in the list of forest reserves. An addition of 142,080 acres was made to the great Cascade Reserve in Oregon in 1901. Over 1,275,000 acres have been withdrawn from sale and entry in the Kootenai River region of northern Montana and Idaho, pending survey for a new forest reserve. This lies along the Canadian border, between Flathead and the Priest River forest reserves.

INCREASE THE  
RESERVES.

The California Water and Forest Association at its annual meeting, December 20, 1901, passed the following resolution:—

"We request our Senators and Representatives in Congress to urge the enactment of such legislation as will result in the immediate Reservation of all Government forest lands within the State of California."

The Sierra Club made a similar request in 1899; and its BULLETIN pointed out the advisability of reserving all Government land about the head-waters of the Sacramento River and its tributaries before the lapse of another year. The reasons for such requests are now stronger than ever. The fact that large transfers of timber land in Butte, Tehama, and Plumas counties have been recently made—two of these involving 100,000 acres—indicate that active lumbering will follow. Indeed, this activity appears on every hand. During the month of April the entire timber-land property of the Northern Pacific in Washington, amounting to 225,000 acres, was transferred to millmen; and an Eau Claire (Wis.) company began lumbering on a 32,000-acre tract of redwood in Del Norte County, California. If the Water and Forest Association will lead in a petition to the proper authorities, asking for the reservation of all forest land in the State, many of the organizations in California interested in the

development and maintenance of her natural resources will join it. The timber-land in California under control of the Nation or the State should be, we believe, a large proportion of the total amount, not only as a guarantee for the proper protection of the water-supply, but for the conservative influence the trained foresters in charge may have on the lumbering over adjacent private property. There is evidence that this influence has already become one of the most important in the whole history of the development of the U. S. Forestry Bureau. Five millions of acres of private and State timber-land are at the present time managed according to the advice and working-plans of this bureau.

**THE LACEY TRANSFER BILL.** For three years the American Forestry Association has urged the transfer of all administrative as well as scientific forestry work on the national forest reserves from the U. S. Land Office to the Bureau of Forestry. The Secretary of the Interior has recommended it in his annual report, and President Roosevelt strongly advised the transfer in his recent message. (See BULLETIN, Jan., 1902, p. 72.) On February 18th, Representative Lacey introduced House Bill No. 11,536, "to transfer certain forest reserves to the control of the Department of Agriculture (Bureau of Forestry), to authorize game and fish protection, and for other purposes." On March 15th, it was reported back from the Committee on Public Lands, and was then referred to the Committee of the Whole. It seems probable that it will pass. If so, the readers of this journal well know that it establishes the most important principle possibly relating to forestry on the Pacific Coast,—namely, the scientific management of the Government reserves.

**THE NATIONAL PARKS.** Two bills have passed the Senate providing for a detail of troops to protect the Mt. Rainier National Park in a manner corresponding to the protection afforded to the Yellowstone, Yosemite, and other parks; also appropriating \$25,000 for the improvement of the park roads, bridges, and trails.

The Sundry Civil Bill carries an appropriation of \$6,000 for the Yosemite Park, \$2,500 for the General Grant Park, and \$10,000 for the Sequoia Park. The last-named sum will be chiefly devoted to the continuation of the carriage-road, by way of the North and Marble forks of the Kaweah, to the Giant Forest.

The Southern Appalachian park, if established, will be

known as the "McKinley National Park and Forest Reserve." A bill appropriating \$10,000,000 to purchase not more than 4,000,000 acres along the Appalachians from Virginia to Georgia and Alabama was introduced, in December, 1901, into the House; and a second bill, appropriating \$5,000,000 for the purchase of 2,000,000 acres was soon after introduced into both House and Senate. The park has received favorable indorsement from forestry experts, from the Secretary of Agriculture and the Secretary of the Interior. President Roosevelt also sent a special message to Congress, asking that body to favorably consider its establishment. Secretary Wilson has pointed out that the purchase does not create a precedent, "as the Government purchased in 1896 from the Blackfeet Indian tribe, of Montana, an area of approximately 615,500 acres for the sum of \$1,500,000, and on February 22, 1897, it became part of the Flathead Forest Reserve." The whole nation should be interested in preserving this region of probably the most beautiful and highly diversified types of hardwood forest trees in temperate climates. This interest is intensified, however, with the people of California from the fact that the passage of this bill will greatly encourage those who seek to have the United States purchase the Calaveras groves.

On February 19th, Mr. Woods, of California, introduced a bill into the House providing by the appropriation of \$200,000 for the purchase of the two sequoia groves above named, with powers to condemn as an alternative. It was referred to the Committee on Public Lands, and reported back favorably on March 6th with amendments. The bill was thereupon referred to the Committee of the Whole House. The California Club, of San Francisco, which has brought the merits of this question before Congress and the Nation for three years with such admirable spirit, still maintains its interest in it.

INSTRUCTION IN FORESTRY. Increased instruction is probably the best indication of the permanent growth of forestry ideas in this country. At the New York State College of Forestry there are twice as many students reported as last year—thirty-eight in number. The Yale School has over thirty—a considerable increase over last year,—and the Forestry Association reports nearly fifty colleges in America as offering instruction in forestry at the present time. The University of California has secured the services of Dr. Fernow, of Cornell, for its summer session, who will deliver nine evening lectures on practical topics in his specialty,

besides daily lectures, during three weeks between June 26th and July 16th.

Part V, Twenty-first Annual Report of the United States Geological Survey, is devoted to the forest reserves, and is the first of its reports on the reservations that deal with California. The Lake Tahoe and the Stanislaus reserves are reviewed as to their forests, standing and cut over. These are the published results of a systematic examination of the timber-lands in question by experts, and will be followed by similar reports on the Sierra reserves and those of Southern California. The completion of these surveys is a matter of the utmost consequence to California, as no practical work in forestry looking towards the self-support of these woodlands will be inaugurated by the Government until the Geological Survey has finished its work upon them and settled their boundaries.

